NATUR CYMRU
Nature of Wales

Number/Rhif 51 • Summer/Haf 2014

- Brecon Beacons
- Wentwood Forest
- Arfordir gwyrdd
- Guide to Gobies
- Taff's Well
- Shakespeare's Meadow
- Turbines at sea

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GOLYGYDDOL EDITORIAL

Gall y bywyd prysur ac yn aml 'rhithwir' mae'r rhan fwyaf ohonom yn ei fyw'r dyddiau hyn ein hysgaru rhag ein hymdeimlad o'r dirwedd naturiol rydym yn byw ynddi, ond mae'r haf yn cyfyngu ar y rhesymau am beidio â 'mynd allan yno'; mae gwyliau'r haf yn cynnig cyfleoedd i gerdded ar hyd llwybrau arfordirol gan edrych ar olion hynafol ar y tirlun, dal gwyniaid yn y pyllau glan môr neu ymweld

Brenda Bullock

â theatr awyr agored. Mae erthyglau yma'n taflu goleuni ar yr holl bynciau hyn, gan egluro rampiau clogwyn at y lan, adnabod gwyniaid y gellid dod o hyd iddynt yn nyfroedd Cymru, a disgrifio prosiect creu dôl llawn blodau y byddai Shakespeare wedi bod yn gyfarwydd â hwy, i ychwanegu at yr awyrgylch a grëwyd gan berfformiadau o'i ddramâu.

Gall ymwelwyr ag un o'n Parciau Cenedlaethol, bellach, fynd â chyfrol yn y Llyfrgell Naturiaethwyr Newydd gyda nhw; darllen erthygl ei hawdur ac, fel fi, rwy'n siŵr, byddwch am ymweld â Bannau Brycheiniog, ac efallai'n cael copi o'r llyfr. Mae disgrifiad o'r ffynnon boeth yn wahoddiad llawn cystal i fynd ac edrych ar 'ryfeddod naturiol'. Mae disgrifiad o daith gerdded drwy dirwedd newidiol Llŷn, lle golyga gwyrddni amaethyddol ddilead cymaint o ansawdd ac o fanylion, yn sobreiddio: ond mae hefyd yn ardystiad o bwysigrwydd gwylio a sylwi ar newid yn y dirwedd. Mae'n rhaid i ni obeithio y bydd y gwleidyddion sy'n defnyddio arian cyhoeddus i gefnogi amaethyddiaeth yn deall yr hyn sy'n digwydd.

Wrth gwrs mae'n rhaid i'r dirwedd ddarparu ar gyfer amrywiaeth eang o anghenion dynol. Mae'r môr hefyd yn ffynhonnell fwyd ac, yn y cyfnod hwn o draflyncu pŵer, ynni: dyma gyflwyno'r achos bod yn rhaid i amgylcheddwyr ymgysylltu â her dod o hyd i ffynonellau ynni adnewyddadwy a di-lygredd. Rydym yn dal fel petai gennym lawer i ddysgu am ddiwallu ein hanghenion mewn ffordd sy'n cydnabod ac yn deall anghenion rhywogaethau eraill. Felly mae erthygl ar blanhigfa fasnachol sy'n cael ei hadfer i'r goedwig hynafol y bu gynt, yn hynod galonogol, nid lleiaf fel arddangosiad o well coedwigaeth, (er y bu'r Ffrancwyr wrthi'n gwneud gwaith coedwigaeth gorchudd parhaus ers canrifoedd).

The busy and often 'virtual' lives so many of us lead these days may dislodge us from our sense of the physical landscape in which we live, but summer limits the reasons not to 'get out there'; summer holidays provide opportunities to walk coastal paths looking at ancient imprints on the landscape, to catch gobies in rock pools or to visit an open-air theatre. Articles here shed light on all these topics, explaining cliff ramps to the shore, identifying gobies which may be encountered in Welsh waters, and describing a project to create a meadow full of flowers which Shakespeare would have been familiar with, to add to the atmosphere created by performances of his plays.

Visitors to one of our National Parks can now take with them a volume in the New Naturalist's Library; read its author's article and I expect, like me, you will want to visit the Brecon Beacons, and perhaps obtain a copy of the book. An account of a thermal spring is equally a great invitation to go and explore a 'natural wonder'. An account of a walk through the changing landscape of Llŷn, where agricultural green means the elimination of so much texture and detail, is sobering but also an endorsement of the importance of observing and noticing change in the landscape. We must hope that the politicians who use public money in support of agriculture understand what is going on.

Of course the landscape has to provide for a wide variety of human needs. The sea is also a source of food and, in these power-hungry times, of energy: here the case is put that environmentalists must engage with the challenge of finding renewable, non-polluting energy sources. We seem still to have a lot to learn about meeting our needs in a way which recognises and understands the needs of other species. So an article on a commercial plantation which is being restored to the ancient forest it once was is hugely encouraging, not least as a demonstration of a better way to do forestry (although the French have been doing continuous cover forestry for centuries).

James Robertson

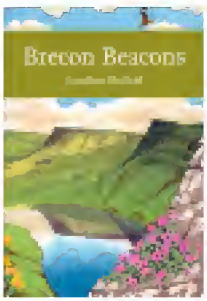
Jonathan Mullard

Brecon Beacons - a volume of natural riches

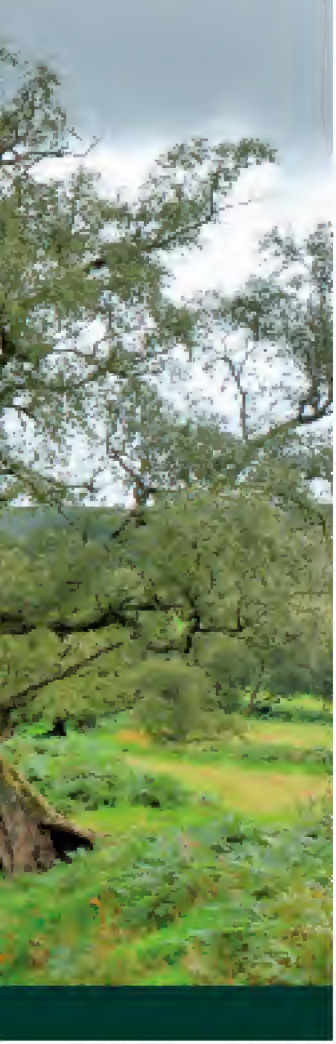
Pen y Fan and Corn Du from Cwm Llwch to the north

Regional volumes in the New Naturalist Library are few and far between, and each one is a landmark for its locality. It is ten years since a volume was devoted to a National Park, and eight years since this author's volume on Gower. Regular contributor JONATHAN MULLARD describes the realisation of his major new work, and the rules that guided him in its writing.

In the Summer 2010 edition of this magazine I set out the background to my second New Naturalist, on the Brecon Beacons, and the hopes I had for writing it. Four years on from that article the book was finally ready for publication by William Collins on 8 May this year, almost exactly eight years to the day since my first book on Gower; published on 9 May 2006 to coincide with the 50th anniversary of the first Area of Outstanding Natural Beauty. The range of available formats in the New Naturalist series is now much wider than when *Gower* was printed and *Brecon Beacons* will be available as a deluxe leather bound volume and an electronic 'Kindle' version, as well as the traditional hardback and paperback.



The new book, whether electronic or paper, is about the same length as Gower but, thanks to the publishers, it includes 59 more photographs than the previous book, a total of 234 in all,



which makes it one of the most illustrated volumes in the series. All have been reproduced at either full page width, or approximately one third page size, which means that there are very few double page spreads without at least one photograph. I have deliberately not included overtly technical material or diagrams in the hope that a more colourful approach will make the book accessible to a wide audience, in line with the stated aim of the New Naturalist series of interesting the general reader in the wildlife of Britain. To supplement my own material, I have been extremely lucky in obtaining a wide range of photographs from other people, including some excellent shots of birds and invertebrates. In the end I actually had too many to choose from but adders, crayfish, mayflies, kingfishers and goshawks are just a few of the species pictured, along with mosses, hawkweeds, whitebeams, yews and a host of other plants.

Harold Grenfell

Red kite *Milvus milvus* Barcud. One of many species decimated throughout Britain during the Victorian era, which can now be seen in numbers at the red kite feeding station at Llanddeusant

Graham Motley

A male Minotaur beetle, a large dung beetle often found in the uplands, on the slopes below Llyn y Fan Fach

The cover of a New Naturalist is always a treat, even for an author. Rather than his usual linocut, Robert Gillmor, the artist for the series, has this time produced a superb watercolour of the 'myth-laden' Llyn y Fan Fach, which brilliantly evokes the essence of the Beacons and its attraction for naturalists. There are many legends associated with Llyn y Fan Fach, located under the botanically rich cliffs of Bannau Sir Gaer. Like Llyn Cwm Llwch, at the foot of Pen y Fan, the lake is traditionally thought to have been bottomless, and it has long been associated with fairies. It is particularly renowned for the legend of the Lady of the Lake, whose sons became the legendary Physicians of Myddfai. In 2011 Llyn y Fan Fach, one of the most southerly examples of a corried lake in Britain, was named as one of the 1,000 'must-see' sights across the globe by Lonely Planet travel guides – the only place in Wales to make the list – so it was a natural choice for a cover illustration. Such interest in the lake is not however

Graham Motley

Red leskea moss *Leskea rufescens*, an important arctic-alpine species discovered by Sam Bosanquet on a crag above the Afon Tawe.

a new phenomenon, Dr Nicholas Roberts in 1695 noting: "Lhan y Vane, a famous fontain resorted to in ye summer time by an infinite number of sick and crazy people!" On the hardback dust jacket two red kites soar above the lake while a ring ouzel, a summer visitor to the Beacons, sings from a nearby rock. In the foreground two plants, purple saxifrage and roseroot, represent some of the rare species that can be found in the mountains.

Hidden riches

Although a large number of people visit the Brecon Beacons every year, comparatively few are aware of the flora and fauna that exists in this seemingly wild and inhospitable mountain landscape and its surroundings. One of the preconceptions I have therefore tried to overcome in the book is that voiced by Dudley Stamp, one of the best-known British geographers of the 20th century, in his New Naturalist *Nature Conservation in Britain*, published in 1969. In this he wrote that: "On the Old Red Sandstone, largely in Brecon, are large expanses of uninhabited, forbidding moorland, large parts of which lie in the Brecon Beacons National Park." There are indeed large areas of acid grassland with little value for wildlife, but the Beacons are a multi-layered landscape and, with a little searching, an astonishing variety of habitats can be found, from extensive cave systems to limestone crags and rich meadows. Individual chapters therefore include a brief ecological history of the area – mountains and moorlands, rivers and waterfalls, cave systems, wetlands and woodlands, amongst others – finishing with a discussion of the likely effects of climate change and the possibility of allowing new landscapes and habitats to develop that might be more robust in a changing world.

I have looked to the future in the last chapter because I believe the Brecon Beacons, more so than many other landscapes, also represent a possibility; the possibility for change and the creation of a new countryside, much richer in wildlife than the current one, but one in which the essence of the mountains remains. To achieve this successfully there needs to be a wider appreciation of the current and potential distribution of plants and animals in the area and the interactions between them and people. I have, however, consciously avoided a detailed debate on the activities of the landowners and conservation bodies, concentrating instead on the wildlife itself. My approach is similar to that of Leslie Harvey, joint author of the first New Naturalist volume on Dartmoor, who wrote: "I am not reconciled to the view of man as the centre about which the affairs of the world revolve. The account I present of Dartmoor is therefore as objective as I have been able to make it, relating directly to the plants and animals which live there, and to the ways in which human arbitrariness may affect them".

In relation to 'human arbitrariness', my earlier article stated that I hoped to include people's experience of wildlife in the Beacons, but it proved more difficult than I expected to obtain examples of such interactions. My two appeals in *Natur Cymru*, which I hoped would be a catalyst for people sharing information with me, unfortunately generated no responses. That said, I have been able to include some fascinating stories, including Sam Bosanquet's discovery of the spectacular Red Leskea moss *Leskea rufescens* on a crag above the Afon Tawe, Dave Grundy's expeditions with colleagues to the Hatterall Ridge to try to find the larvae of the rare Silurian moth in the Black Mountains, and the

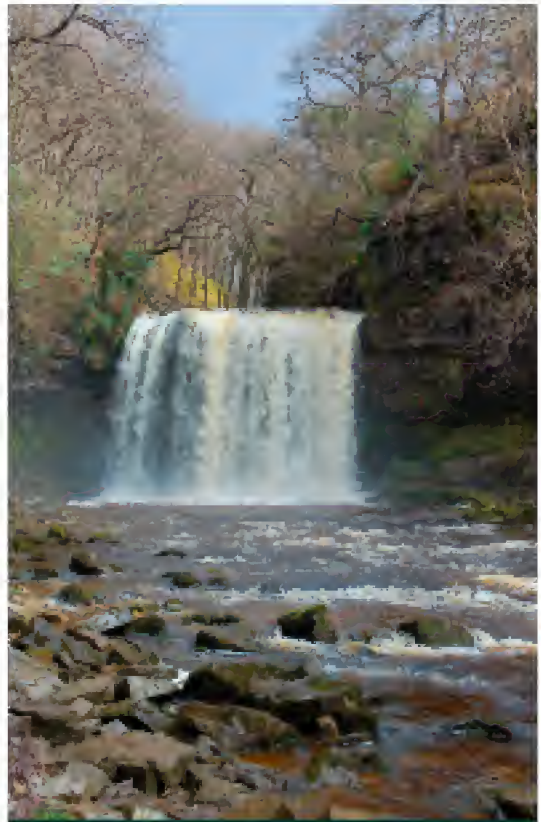
circumstances behind Steve Wilce's superb photograph of a barn owl in Llangasty churchyard.

Discovery and locality

While writing a regional volume like Brecon Beacons or Gower, I have a number of personal 'rules' which I apply as a way of structuring the book and presenting the information. The first of these is 'keep the feeling of discovery', avoiding writing as an expert about subjects I already know. While this may seem a strange thing to do it has enabled me to look at everything through fresh eyes and produce a balanced story of the area's natural history, relatively free from personal enthusiasms, something which I feel is important. In my update on progress with the book for this magazine (35 – special Brecon Beacons edition) I quoted John Stewart Collis (1994) who wrote: "I have learned from long experience that there is nothing that is not marvellous and that the saying of Aristotle is true – that in every natural phenomenon there is something wonderful, nay, in truth, many wonders. We are born and placed among wonders and surrounded by them, so that to whatever object the eye first turns, the same is wonderful and full of wonders, if only we will examine it for a while". It is this examination of wonders that has been central to my first rule.

My second rule is 'create a sense of place'. Names fascinate me, whether they are old field names, forgotten names of particular locations, or colloquial species names. In both my books to date I have therefore deliberately used names to develop the distinctiveness of an area and to draw readers into the narrative. In *Gower* I provided lists of the local names of plants and animals and in *Brecon Beacons* I included a section in the first chapter which discussed the names of geographic features. I returned to this theme throughout the book, citing, for example, Pant brwyn trorum, the 'hollow of the twisted rushes', to the north of Bannau Sir Gaer and Fan Brycheiniog. This is the location of the corkscrew, or spiral, rush. The status of spiral rush is debatable but the seedlings have spiralling stems so it is certainly a distinct genotype and its occurrence in the wild suggests that it deserves recognition as a botanical variety, or form. David Davies, the palaeo-botanist who did so much to improve our understanding of the Welsh Coal Measures fossil flora, collected specimens from Pant brwyn trorum for the National Museum of Wales on 19 July 1933, and I have been able to include a photograph of the actual herbarium specimen submitted by him.

My third rule is 'never forget the past' and in the case of the present book this meant including material on Edward Lhuyd, the famous Welsh naturalist who discovered the first fossil fish in Wales on the Blorenge, near Abergavenny. Lhuyd, who also appeared in *Gower,* puzzled over how marine fossils could be found in terrestrial situations and gave examples he had personally seen in the Beacons, such as in the cave located beneath Carreg Cennan castle and in Porth yr Ogof cave. Similarly I had to include Alfred Russel Wallace, one of the most important figures of 19th century biology, who developed his skills as a naturalist in the Brecon



Jonathan Mullard

Sgwd yr Eira, which translates as 'fall of snow', after several days of heavy rain in March 2010

Beacons. The book is dedicated to his memory. Wallace was helping his brother survey the ground for the new railway line through the Neath valley but spent his leisure time "wandering about this beautiful district, on my part in search of insects, while my brother always had his eyes open for any uncommon bird or reptile". He climbed to the summit of Pen y Fan, visited prehistoric sites, collected rare insects, and once spent an uncomfortable night in the entrance to Porth yr Ogof cave in order to "try sleeping out-of-doors, with no shelter or bed but what nature provided" as he and his brother were "at this time determined, if possible, to go abroad into more or less wild countries". Wallace subsequently achieved his aim, becoming the pre-eminent collector and tropical field biologist of his generation.

From enthusiasts past to present

My fourth rule is 'record and acknowledge the enthusiasts', such as Steve Smith, Assistant Area Warden for the National Park Authority, who in his own time traps and rings an average of 250 young whinchats on the Blorenge each summer. The study has highlighted the fact that the whinchat is becoming scarcer, particularly at a local level, with the population receding from its southern outposts. This is in line with national surveys which show that whinchat numbers in Britain more than halved between 1995 and 2008: the cause for this dramatic decline is unknown, although substantial recent rises in losses of eggs and chicks in the nest would seem to be a factor. Similarly I have included Andrew Lewington's photographs of cave invertebrates, including Britain's only troglobitic spider *Porrhomma rosenhaueri* (*Natur Cymru* 40 p44). This is a straw coloured blind spider, only 2 millimetres long, which spends most of its time hiding in crevices. The first British record in 1971 was from Ogof-y-Ci, part of Nant Glais Caves, the only cave system in Britain currently notified on biological grounds. The spider is morphologically adapted to life within the permanent darkness of the deep cave zone, where it probably feeds largely on springtails. Although cave fauna is undoubtedly under-recorded, sufficient work has been carried out in Britain to suggest that *P. rosenhaueri* is genuinely rare. It is a paleotroglobite, meaning that it survived the repeated glaciations of the Pleistocene

Jonathan Mullard

Craig y Cilau National Nature Reserve, a spectacular limestone escarpment near Crickhowell and the location of many rare plants.

Jonathan Mullard

Craig y Cilau hawkweed, a very rare endemic Welsh hawkweed confined to limestone cliffs in and around the National Nature Reserve

underground, in comparison to neotroglobites, which have colonized the subterranean habitat relatively recently. There are probably more naturalists active at present, working across a wider range of subjects, than at any other time in the area's history but the information is fragmented and sometimes hard to find. It is thanks to many of these people that it has been possible to bring the material together in the book.

My fifth and final rule is 're-explore the area'. I have been lucky enough to have been supported in this respect by Graham Motley, now with Natural Resources Wales, and Tim Rich, formerly with the National Museum of Wales. Developing the text from both personal knowledge and written sources always raises queries and issues that need to be examined further and it is important to explore these directly. As a result I have had some wonderful days in the field, notably a day at Craig y Cilau National Nature Reserve where the acidic rocks give way to limestone cliffs. Due to the presence of the limestone and limited grazing because of the steep and inaccessible nature of the rock face, it is one of the most outstanding botanical sites in Wales, with the cliffs supporting many scarce plants and at least 250 species being recorded. It is perhaps best known for its five rare endemic whitebeams (*Natur Cymru* 35) but is equally important for hawkweeds, including Craig y Cilau hawkweed and Llangattock hawkweed. Other important plants found here include angular Solomon's seal, mountain melick, maiden pink, hutchinsia and the most southerly British population of alpine enchanter's nightshade.

Brecon Beacons is the first wholly new account of a National Park to be published in the New Naturalist series in the last 10 years and as such has been eagerly awaited. I hope that people enjoy reading it as much as I have enjoyed the process of writing it.

***Jonathan Mullard**, a regular contributor to* Natur Cymru, *launched the* Brecon Beacons *New Naturalist with a talk and book signing at Hay Festival on Thursday 29th May.*

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Bannau Brycheiniog

Anela ail deitl *New Naturalist* rhanbarthol Jonathan Mullard at gynulleidfa eang, gyda hyd yn oed rhagor o luniau na'i lyfr ar Benrhyn Gŵyr, a chlawr atgofus gan Robert Gillmor. Wedi'i ddarlunio'n aml yn weundir llwm, mae'r Bannau, mewn gwirionedd, yn cynnwys amrywiaeth rhyfeddol o gynefinoedd. Mae hefyd yn dirwedd o bosibiliadau'r dyfodol, testun y bennod olaf. Y rheolau fu'n ganllaw i'r awdur wrth ysgrifennu fu cadw ymdeimlad o ddarganfod, creu naws lle, beidio byth ag anghofio'r gorffennol, cofnodi a chydnabod y rhai brwd, ac ail-archwilio'r fro'n gyson. Y canlyniad yw'r ymdriniaeth gwbl newydd gyntaf o Barc Cenedlaethol yn y gyfres New Naturalist ers degawd.

Barry Embling

Wentwood:
an ancient forest back from the brink

Restoring a large area of a once-great forest from commercial plantation to a continuous canopy of native broad-leaves, ensuring that the rich assemblage of plants and animals associated with ancient woodland can once more thrive, is an ambitious task. It is also one likely to catch the public imagination. And, as ***BARRY EMBLING*** *explains, it could help to demonstrate the value and effectiveness of a different, environmentally sensitive approach to forest management.*

Beech woodland in Wentwood is evidenced by relict coppice stools and pollards

The decision by Coed Cadw (the Woodland Trust) to purchase 352 ha of Wentwood (*Natur Cymru* 17) caused a real stir in the worlds of conservation and forestry. After all, the land was previously utilised as an intensive commercial forestry plantation with around 95% conifer cover. But this particular forestry plantation is Wales' largest single area of ancient woodland, and it required urgent restoration.

The forestry sector was quick to point out that one of Wales' most profitable commercial conifer plantations was being taken out of production; however this is not quite the case. The restoration will involve the removal of thousands of tonnes of exotic conifers each year for decades to come, as the transformation to predominantly native broadleaves gradually takes place. And even post-restoration, there are plans for a less intensive timber production model. Coed Cadw recognises that commercial forestry is vital to our rural economy in Wales. But commercial forestry should be in the right place, and not on our scarce and valuable ancient woodland sites.

This acquisition of a piece of land that has previously been managed intensively perhaps reflects a wider move by conservation organisations, to acquire land and manage it for multiple objectives, but primarily to deliver biodiversity. Another local example of this is Wyeswood Common (*Natur Cymru* 27 p8) where Gwent Wildlife Trust acquired 42ha of intensively managed farmland to restore to unimproved grassland and create linkage and extend existing unimproved grassland sites. The public certainly have an appetite for these kinds of restoration projects; the fundraising for Wentwood has been hugely successful, both from grant-awarding bodies and from generous donations from individuals, especially local people.

Forest history

Wentwood is a relic of a far larger 'Coit Gwent' that stretched from the present-day outskirts of Newport all the way to the River Wye. In Bronze and Iron Age times Wentwood was likely very open, as evidenced by hilltop tumuli, hill forts and standing stones. From early Medieval times Wentwood has been owned and managed by successive marcher lords from Chepstow Castle, by local landowners (including the Cistercian monks of Tintern), and by those with commoner's rights. Varying extents of open heathland with woodland and wood pasture is the likely landscape of the forest at various times through history, particularly with the influence of people practicing their commoner's rights, charcoal making and over-exploitation of timber at different times.

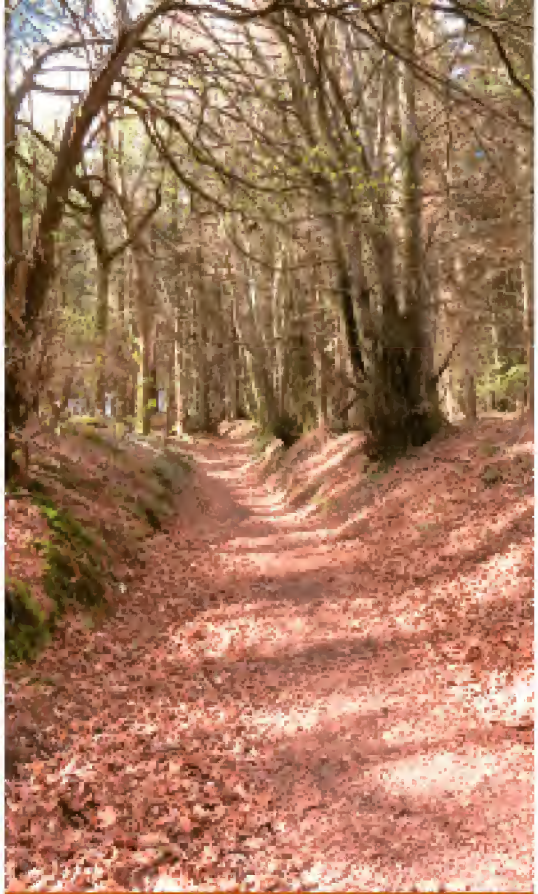
From the early 1700s small amounts of exotic conifer planting took place, some of the first in the UK. The 1880 OS map shows larger areas of conifers. Vast numbers of broadleaves were removed over the two World Wars, and most of the conifer planting we see today is from the 1950s to 1970s. Coed Cadw purchased their 352 ha out of a total of 1000ha in 2006, and most of the remainder is owned by Natural Resources Wales (NRW), having been acquired by the Forestry Commission (FC) in 1946. FC and private forestry companies continued with plantation forestry from then, and even the Coed Cadw holding currently has less than 5% broadleaved woodland.

This is what Oliver Rackham says about Wentwood in an as yet unpublished paper:
Two rounds of planting and felling have destroyed the original vegetation of Wentwood with singular completeness. In most places not even the stumps of the previous trees can be discerned, even though oak stumps should last a hundred years. The ground vegetation has disappeared almost completely under Douglas fir and spruce, less completely under pine and larch.

Return of the natives

Fortunately there still are surviving remnants of natural vegetation, and these have increased since Rackham's observations, as an annual thinning programme was started immediately after purchase and has continued unabated. Present-day Wentwood overlies Lower Old Red sandstone, producing acid soils, and exists between the elevations of around 160 to just over 300m. Native trees are thinly distributed within plantations but are more numerous as boundary trees and stools, following streams and ditches: they are also present at the margins of plantations, and especially along the sides of the many holloways that criss-cross the site.

Wentwood was previously utilised as an intensive commercial forestry plantation with around 95% conifer cover.



Barry Embling

Native trees are thinly distributed within plantations but are more numerous as boundary trees and stools, especially along the sides of the many holloways that criss-cross the site.

Young and failed commercial crops that have not been 'weeded' hold a high percentage of native trees and will therefore have a quicker transformation.

The highest ground, with the poorest and most heavily leached soils with pedunculate oak *Quercus robur* and beech *Fagus sylvatica*, has a heath-like ground flora that one does not always associate with woodland. Species such as climbing corydalis *Ceratocapnos claviculata*, heather *Calluna vulgaris*, broom *Cytisus scoparius*, bilberry *Vaccinium myrtillus*, heath bedstraw *Galium saxatile*, pill sedge *Carex pilulifera*, slender St John's Wort *Hypericum pulchrum*, and broad buckler fern *Dryopteris dilatata* occur. Many are hidden in the seed bank, revealing themselves when there are sudden breaks in the canopy.

Descending slightly lower there's still widespread pedunculate oak–beech woodland that is evidenced

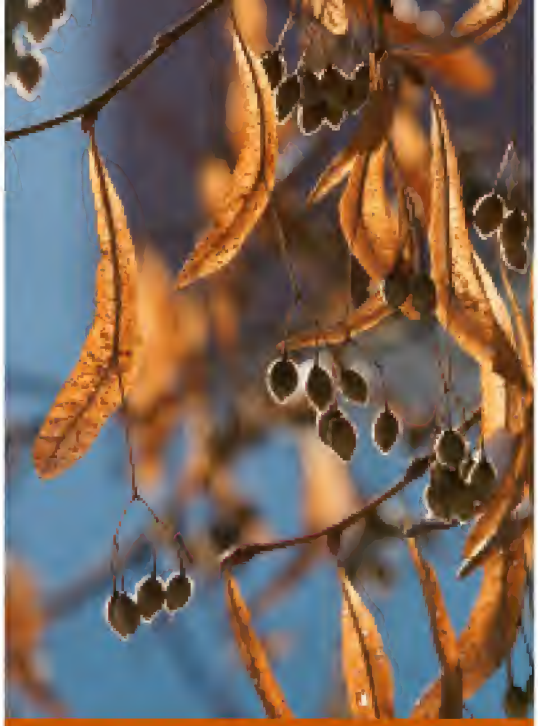
Barry Embling

Riparian alders

by relict coppice stools and pollards with an increasing lowland ground flora, including often dominant bramble *Rubus fruticosus agg.*, bracken *Pteridium aquilinum*, bluebell *Hyacinthoides non-scripta*, foxglove *Digitalis purpurea*, wood-sorrel *Oxalis acetosella*, and perforate St John's-wort *Hypericum perforatum*. Holly *Ilex aquifolium* is ubiquitous at Wentwood, whereas hazel *Corylus avellana* becomes more abundant as one descends. Yew *Taxus baccata* has a thin distribution throughout, and has perhaps suffered as a result of being exploited for timber. Goat willow *Salix caprea*, silver birch *Betula pendula* and rowan *Sorbus aucuparia* are the usual species that naturally regenerate everywhere. Small-leaved lime *Tilia cordata* has recently been re-discovered: it is undoubtedly very rare, as it has probably always been, but is present in pollen core samples taken just outside the woodland boundary. Ash *Fraxinus excelsior*, wild cherry *Prunus avium* and wych elm *Ulmus glabra* are more widespread as one gets lower, while alder *Alnus glutinosa* occurs along streams with ground flora that includes Angelica

André Karwath Wikimedia Commons Share 2.5 Generic

Slender St John's Wort *Hypericum pulchrum* Eurinllys meinsyth - not usually associated with woodlands



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Small leaved lime *Tilia cordata*

Angelica sylvestris, figwort *Scrophularia nodosa*, and enchanter's nightshade *Circaea lutetiana*. Field maple *Acer campestris* is only present on one north-facing slope of more calcareous soil, together with good elm–ash woodland and a rich ground flora that includes dog's-mercury *Mercurialis perennis* and lady fern *Athyrium filix-femina*.

Wentwood is on a large scale itself, and is well connected to other woodlands at a landscape scale. It therefore has an ecological robustness, and as such there is much retained biodiversity interest. There's a population of dormice found throughout the site, presumably living at lower densities due to the woodland type. A rich woodland bird assemblage includes woodcock, goshawk, buzzard, wood warbler, crossbill, willow tit, hawfinch and raven, and the site is host to a significant (certainly in Wales) population of firecrests. With the sudden appearance of a large number of clear-fells and subsequent thicket-stage tree cover, we can expect the bird population to shift towards open woodland species like tree pipit and nightjar, and perhaps even lead to re-colonisation by whinchat and woodlark. There is an excellent fungal flora and, as evidence of this, many people can be found foraying in the autumn, including restaurant owners from Cardiff! A site of such a size is also able

Andy Hay rspb-images.com

Hawfinch *Coccothraustes coccothraustes* gylfinbraff

Andy Hay rspb-images.com

Wood warbler *Phylloscopus sibilatrix* telor y coed

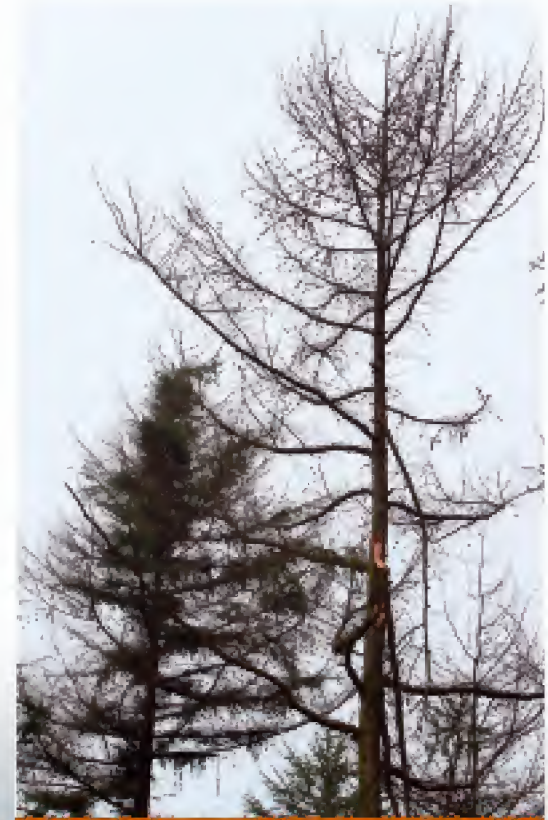
to absorb some recreational pressure, and Coed Cadw and NRW, through a joint Recreational Steering Group, plan appropriate usage that is always low key.

Continuous cover

Initial restoration management is often an emergency halo-thin to save any existing remnant broadleaved trees from further conifer encroachment. However, in forestry terms the ongoing silvicultural method being used by Coed Cadw is Continuous Cover Forestry (CCF). In practical terms this involves a 'selection' thin (currently on a 4-year rotation), with the plan to transform to native broadleaves by gradually removing more timber volume than would happen in a conventional 'standard' thin. The latter is designed to maximise timber volume, with a clear-felling and replanting at the end of rotation. The 'selection' thin creates lighter conditions on the forest floor that enables natural regeneration to occur, whilst at the same time not allowing so much light that species

such as bramble predominate. The aim of this management is to convert the stands from an even-aged monoculture to a permanently irregular structure with mixed tree species and ages.

Due to the lack of native broadleaves that exist as a natural seed source, there is an acceptance of some naturally regenerating conifer where it occurs, to help with recruitment of new canopy layers. CCF is a relatively new method in the UK, so it's being closely monitored with vegetation transects, fixed-point photography and by carefully measuring and monitoring the standing timber volumes. This then informs the thinning intensity at each intervention: reducing tree density ensures natural regeneration is optimised by managing light levels. This method is obviously very different from the more traditional planting, thinning then clear-felling at the end of a rotation, which is not only very damaging to sensitive ancient woodland flora and other organisms, but also has huge impacts on the landscape. For Coed Cadw, part of the purpose of Wentwood is to demonstrate CCF as a restoration technique and an option for the wider forestry industry, especially as studies have shown that this gradual form of transformation can actually be more profitable than the conventional felling and replanting model, and certainly has far less environmental impact.



Barry Embling

Tree affected by *Phytophthora*

This restoration through sensitive and gradual thinning of the conifers has however been turned on its head through the recent phenomenon of *Phytophthora ramorum* that arrived there in the spring of 2013. Its effect on larch has drastically changed the extent of woodland to which the CCF system can now be applied. Coed Cadw alone has over 100ha planted with larch and already 26ha has

Barry Embling

Clear-felled area

Barry Embling

The Trust's plans to restore Wentwood through sensitive, gradual thinning of conifers had to be turned on their head due to the outbreak of *Phytophthora ramorum*

been clear-felled, undoing the previous careful thinning operations. Of all the conifers, larch would be the species that one would have least wanted to lose. Where it occurs, there is the richest surviving ground flora and the most advanced stages of natural regeneration by native broadleaves because of the higher light levels. In order to preserve any remnant ground flora, Coed Cadw and NRW have both replanted these new clear-felled sites with site-native broadleaves at the earliest opportunity, thus hastening canopy-closure. Aside from the larch, thinning in Douglas fir and Norway spruce stands continues. Some clear-felled areas will be managed as permanent open heathland through grazing, and ride-edges managed as coppice to maintain them as open corridors.

The creation of NRW has brought the formulation of a joint management agreement between Coed Cadw and NRW at Wentwood, with expected continued closer working between both organisations who share long-term objectives there. This includes a similar restoration plan and, crucially, a joint deer management strategy that is essential for successful natural regeneration and tree establishment post-*Phytophthora*. I hope that this management partnership at Wentwood can be replicated elsewhere, especially where the aim is to restore previously intensively managed habitats for multi-purpose outcomes, particularly biodiversity, on a large scale. With climate change and tree diseases threatening our woodland heritage, the need for such projects has never been greater.

Barry Embling *manages woodlands for Coed Cadw in South East Wales. He previously worked as Area Manager for the RSPB on woodland sites and projects in Gloucestershire.*

Coed Gwent: adfer y gogoniant

Ar un adeg, roedd coed Gwent yn ymestyn o Gasnewydd heddiw hyd Wy, yn gymysgedd o weundir agored, coedwigoedd a phorfeydd. Mae tystiolaeth y gwnaed coedlo, ac y bu gorgymynu, ar wahanol adegau. Plannwyd y rhan fwyaf o'r coed conwydd presennol yn y 1950au-1970au. Mae coedwigaeth fasnachol yn anhepgor ar gyfer economi gwledig, ond cyfunir hyn yn awr ag arferion rheoli newydd sy'n gweld dychweliad coed brodorol, llydanddail sy'n cynnal amrywiaeth eang o blanhigion llawr a rhywogaethau cysylltiedig.

Ivor Rees

A riddle in the cliffs

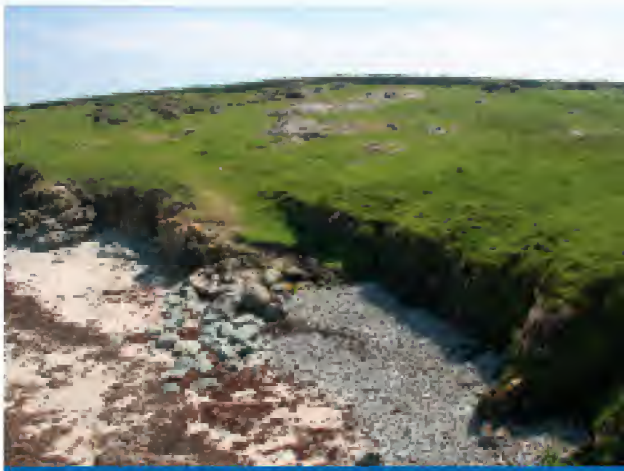
Porth y mor Ramp allowed pack horses to carry weed and sand from the shore.

Walking the coast offers the chance to wonder at the close connections between land and sea which once characterised earlier human society. One puzzle which intrigued ***IVOR and JANE REES*** *were the ramps which had been constructed in remote places; as they describe here, the people who built them were winning prosperity from the sea.*

The coastal paths of Wales are enjoyed by a wide spectrum of people, from those just looking for physical challenges to others with senses more highly attuned to wildlife and landforms. On even the wildest parts of the coast one does not have to search far to detect the hand of man. Many archaeological features are on OS maps and frequent artefacts from both world wars have yet to be fully overgrown. To ecologists it is often the old field banks, ditches and marks of cultivation, outside the current farmland boundaries, that provoke curiosity about former patterns of land use.

While exploring several parts of the Welsh coast we began to wonder about the ramps that can be seen on cliff slopes. Even when partly concealed by scrub or where the foot has washed away, they are surprisingly frequent once one is aware of them. The significance of apparently man-made ramps, leading to small beaches and coves, seems to have been overlooked in accounts of coastal archaeology. Such ramps

are most obvious where bedrock is overlain by glacial till, resulting in rocky or mixed boulder shores backed by steep clay/grassy slopes, but there are many other old tracks to the shore. Why were so many tracks carved out to get to or from remote beaches? Beyond the transport of goods by sea, before there were adequate roads, or to get to places suitable for launching fishing boats, there must have been other good reasons for improving access to the shore.



Ivor Rees

Porth Fudr ramp leading to shelly sand and much drift weed. Note the boulders supporting the foot of the ramp.

Prosperity from the sea

An obvious question is what, in the past, might have been of sufficient value to warrant the labour of making routes to shores for pack animals, or even carts? Plausible answers can be found in several of the 18th and 19th century accounts of agriculture in various parts of Wales. One such is *A Topographical Dictionary of Wales* by Samuel Lewis (1833). For Cardiganshire he wrote that the principle "extraordinary manures" were shell sand and seaweed. The term 'manure', before artificial fertilisers were available, covered much more than just farmyard muck. Lewis indicated that the sand was carried many miles inland in carts and wagons and coastwise in sloops. Other authors, referring to other counties, mention pack horses each carrying two sacks of shell sand to be taken inland.

One such source is the 1748 book of plans of harbours in St George's Channel by Lewis Morris. This work included commentaries on trade and potential improvements. Referring to Aberffraw in Anglesey, he says "The sand of this place is good manure and is carried on horses for some miles into the country". Helen Ramage (1987) in *Portraits of an Island: Eighteenth Century Anglesey* also refers to documents showing the importance attached to beach deposits, and particularly shelly sand, as good soil manure. A bank of shells in Red Wharf Bay seems to have been particularly valued, as some farm leases specified the loads to be carried to certain fields. Just offshore in Red Wharf Bay there is still an area of muddy sand with a benthic fauna unusually rich in a range of bivalve molluscs whose shells wash up in quantity whenever there are northerly gales. Added to this, the bay has shell from cockle and mussel beds. The many lanes radiating inland from Red Wharf Bay probably attest to the value placed on boosting fertility using marine resources. Ramage also mentions a locality in the Menai Strait with shell that was very highly regarded. This probably relates to the unusual banks of gravel in a tide-swept section between the bridges which consist mainly of barnacle shell plates. Unlike the west coasts of Ireland and Scotland, Wales has no beaches derived from beds of the calcareous red seaweeds known as maerl.

Knotted wrack *Ascophyllum nodosum*

Seaweed harvest

Pre-industrial accounts from all Welsh coastal counties from Glamorgan to Denbigh make frequent reference to seaweed as manure. The seaweed was mainly collected in large quantities after being washed up by storms. A striking, but perhaps exaggerated account, records that as much as two thousand cart loads of seaweed were cast up by a storm near New Quay, all of which were carried away by farmers in a fortnight. Elsewhere there is a claim that for 70 years "undiminished" crops of barley were taken from a field manured with seaweed. A letter in the Anglesey Archives tells of two men drowning in 1843 when the boat they were using to collect seaweed for potato manure capsized. There are only a few mentions of seaweed harvesting by cutting in

Alfred Guillon 1899

Wales. Seaweeds such as egg or knotted wrack, *Ascophyllum nodosum*, which are abundant in sheltered locations, can be harvested systematically if the lowest section is left, as they grow from the base. Only a small amount of kelp burning seems to have taken place round Wales compared to parts of Scotland, but the glass makers of Bristol did take some from South Wales.

Lewis, reporting on Cardiganshire, indicated that the seaweed was most commonly spread on the land and then ploughed in, though sometimes it was composted. Seaweed may have continued to be used on a limited scale, for more than just gardens or vegetable patches, long after artificial fertilisers became available. Seaweeds and particularly the oarweeds or kelps contain high amounts of potash. When the German source of potash fertiliser ceased to be available during World War I, there was renewed interest and a flurry of scientific studies sponsored by government into the composition and potential uses of seaweed. This showed that some constituents of seaweeds were also acting as conditioners in clay soils. Roman writers mentioned the use of seaweed as manure and in Wales there is some documentary evidence of it at least back to Tudor times. Memory of seaweed use on coastal farms still persists. Bryn Jones (National Trust countryside manager in Anglesey) tells us that seaweed was added to farmyard manure heaps in alternating layers on a roughly one to one basis. Some seaweed was fed to livestock; in a few places where cattle have access to the shore, they can be seen to relish eating freshly stranded kelp.

Ivor Rees

Cattle relish freshly stranded seaweed and sometimes go down onto intertidal rocks to get it

Michel Briand CC-SA-3.0

Seaweed gathering at Plouguerneau, Brittany, in 2012

What other things might have been carried inland along with the shell sand and seaweed? The most obvious to anyone who has ever used seaweed on a vegetable plot will be the sand hoppers *Talitrus saltator* and *Orchestia gamarella*. Farmyard hens would have made short work of them, but in domestic settings they move towards house lights and turn up in unexpected places. Did seeds of coastal plants get carried inland to grow on the sides of the lanes long before road salt induced the spread of scurvy grass, *Cochlearia* spp., along main roads and motorways? More importantly, enhancement of the productivity of farmland in coastal districts by using marine manures is likely to have been a long established practice. It must have allowed more intensive land use, with consequences for ecology, landscapes and settlement patterns that still persist. The tracks and ramps made to haul seaweed and shelly sand from the shore represent evidence of historical ecology and pre-industrial agriculture. At the same time the sea was a major highway for trade in produce and in a few places the sea, through tide mills, even provided the power to grind the corn. It is tempting to suggest that Anglesey's reputation as Môn Mam Cymru may have rested in part on fertility derived from the sea.

Ivor and Jane Rees *have a long standing interest in the natural history of their home territory of Anglesey and in Welsh nature, on land and at sea.*

Dirgelwch y Clogwyni

Wrth grwydro arfordir Cymru, mae'n syndod pa mor aml y gwelwn rampiau artiffisial yn arwain at gildraethau bychain a thraethau. Un o ddibenion y nodweddion archaeolegol hyn, a anwybyddwyd i raddau helaeth, oedd dod â chyfoeth o ffrwythlondeb i'r lan ar gyfer y caeau. Deuid â thywod cregyn i'r tir fel cyflyrydd i'r pridd ac i hybu ffrwythlondeb. Defnyddid cregyn, o welyau cocos a chregyn gleision yn yr un modd. Cesglid pentyrrau anferth o wymon, megis gwymon codog a môr-wiail, a'u haredig i'r caeau neu eu compostio cyn eu gwasgaru. Felly roedd y môr yn ffynhonnell doreithiog, yn ogystal â bod yn briffordd ar gyfer cludiant ac yn ffynhonnell ynni ar gyfer melinau llanw oedd yn malu grawn.

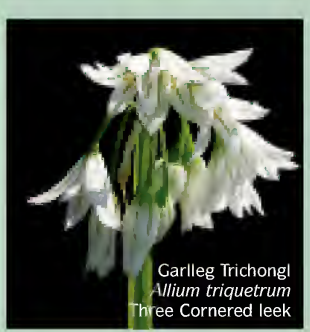
Clytwaith y caeau bras yn gwrthgyferbynnu'n amlwg a'r tir mwy 'gwyllt' wrth edrych ar Fynydd Mawr ym mhen eithaf y penrhyn.

A mosaic of verdant fields contrasts with the 'wilder' land of Mynydd Mawr

Llun/au yr arfordir: Iwan Edgar

Arfordir gwyrdd - rhy wyrdd?

***IWAN EDGAR** yn rhoi gwybod am newidiadau i dirwedd ei gynefin yn Llŷn y mae polisi amaethyddol wedi annog ffermwyr i'w cyflawni.*



Garlleg Trichongl
Allium triquetrum
Three Cornered leek

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Ar ôl pendroni am y tywydd a gwglio i'r perwyl, penderfynwyd ei mentro hi ar ŵyl banc Calan Mai ar hyd arfordir gogledd Llŷn: taith tua 30 milltir o'r Eifl yn y gogledd-ddwyrain i Fynydd Mawr uwchben Swnt Enlli yn y de-orllewin. Rhwng bob dim ac ambell stop, mi gymerodd bedair awr ar ddeg i'w gwneud. A minnau yn un o Lŷn 'doedd unman yn ddieithr i mi, ond roedd yn rhoi cyfle i weld darn o wlad yn ei gyfanrwydd.

Nid oedd yn syndod sylweddoli fod cymaint o'r arfordir hwn, o ran yr amgylchedd, wedi dirywio'n arw. Er gwaethaf y dynodiadau, gan gynnwys Ardal o Harddwch Naturiol Eithriadol sy'n cwmpasu'r cwbl (heblaw am ddarn rownd Nefyn), mae mannau pur symol eu hansawdd. Efallai bod hyn yn glod i amaethwyr yn y rhannau hyn o Lŷn. Canys diwedd y gân yw'r geiniog ac felly mae pob ceiniog yn cael ei gwasgu o'r tir. Ond os oes bwriad i amddiffyn a hyrwyddo cynefinoedd naturiol a lled-naturiol ar arfordir o'r math hwn, yna dylid gobeithio am well, a chael polisïau cyhoeddus mwy goleuedig wedi eu targedu i'r diben hwnnw.

I fanylu ychydig: cychwynnwyd drwy gerdded i fyny Bwlch yr Eifl i gyrraedd at olwg Nant Gwrtheyrn. Braf oedd gweld torri helaeth ar y

blanhigfa binwydd erchyll sy'n fwgwd marw yma. A minnau'n cofio'r lle hebddynt, mawr obeithiaf na fydd polisi o orfod ailblannu'r erchylltra yma yn ôl fel sydd wedi digwydd mewn cymaint o fannau o werth amgylcheddol. Ysywaeth braidd am bentref Nant Gwrtheyrn ei hun, mae yna ryw baradocs fod pobl yn ceisio'r unig fannau ac o'u cael yn mynd ati i ddifetha'r hyn aed yno i'w geisio. Mi oedd y lle'n un gacen hyll o lygredd golau gwyn ac orinj.

Ta waeth am hynny, mi oedd gwerth y cynefin naturiol yma o radd uchel. Yn wir doedd fawr ddim i gwyno amdano heibio Carreg Llam a Phistyll a thrwy Nefyn a Morfa Nefyn a Phorthdinllaen (gan nodi ymlediad rhyfeddol y Garlleg Trichongl *Allium triquetrum* mewn nifer o fannau ar y daith.) Ymddengys hefyd fod y Golff ym Morthdinllaen yn lle sydd, drwy ddamwain efallai, yn hyrwyddo amrywiaeth dda o gynefinoedd gwyllt o ansawdd go lew. Ond ar derfyn y Golff yn Aber-geirch - lai na

Aredig da – ond dim modfedd ar ôl i lystyfiant naturiol.

Good ploughing: but not an inch left for natural vegetation

hanner y ffordd ar hyd fy nhaith – och a gwae, dyma gychwyn dirywio.

Fel y dywedais, nid oedd hyn yn sylweddoliad newydd i mi, am fod y lle yn gyfarwydd i mi. A thua tair blynedd yn ôl profiad hynod gyffelyb fu troedio arfordir gogledd Sir Benfro. Lle eithriadol o debyg i ogledd Llŷn yw'r rhan hwnnw o arfordir Cymru, gyda chlogwyni creigiog a gelltydd môr serth gyda rhimyn lleiaf ar ben yr allt i gerddwyr. Yno hefyd roedd rhimyn cul i gerdded lle ceid planhigion naturiol, ond heblaw am y tiroedd a ffensiwyd i greu parth ar gyfer cerddwyr roedd anialwch maith gwyrdd defeidiog dinodwedd.

Arllwysiad gwrteithiau yn cyrraedd rhai mannau yn y creigiau, nes ei bod yn hawdd gweld y gwahaniaeth rhwng y mannau na chafodd y faith faith.

It's easy to see where the flow of fertiliser reached these rocks.

Fel yn Sir Benfro mae rhai mannau ar y rhimyn hwnnw yn llawn planhigion bras buarth ffarm: yn dafol, ysgall a danadl poethion. Ac o gael unrhyw lifeiriant dŵr ffo i'r allt, o diroedd amaethyddol cyfagos, yna daw'r planhigion hyn i'w ganlyn. Mewn ambell le ar y siwrnai hon roedd y llwybr yn dew o dyfiant gwelltog ir lle nad oedd unrhyw bori'n digwydd, gan beri i rywun suddo hyd at ei ffêr mewn gwellt bras. Yn amlwg felly yr oedd gwrtaith yn ffoi drwy'r dŵr ac yn cael ei chwythu dros y llwybr i'r darn 'gwyllt'.

Cwmistir at Benrhyn Rhosgor, bellach yn brin o fioamrywiaeth. Cofiaf Benrhyn Rhosgor yn rhostir neilltuol o gyfoethog cyn ei aredig yn 1974.

Penrhyn Rhosgor – now lacking in biodiversity, I remember an exceedingly rich moor prior to its ploughing in 1974.

Efallai na fyddai hynny yn poeni dim ar nifer o gerddwyr, ond siawns bod ansawdd amgylcheddol unrhyw daith yn ffactor sy'n cyfrannu at ei gwerth – hyd yn oed i'r mwyaf anwybodus. Hwyrach ei bod yn mennu mwy arnaf i am fod gennyf fwy o ddiddordeb mewn planhigion a chynefinoedd. Dichon y bydd cynnydd cyffredinol mewn ymwybyddiaeth o werth amgylcheddol yn peri i fwy sbïo'n iawn ar arfordiroedd fel hyn. O dderbyn bod hyn yn anffafriol, yna beth ellid ei wneud i wella'r sefyllfa?

Un opsiwn syml fyddai lledu'r rhimyn ar yr ymyl a chodi clawdd pridd ymhellach o'r môr. Fyddai hynny'n gwneud dim gwahaniaeth i'r pori defaid (a weithiau wartheg). Gellid eu gadael i bori ar y rhan hwnnw'r un fath, os mai dyna'r gofyn amgylcheddol ar ddarn arbennig, a'u rhwystro mewn mannau eraill os mai math arall o gynefin y byddid yn ei geisio. Ac wrth fynd ymlaen ar y daith gwelwyd union hynny wedi digwydd i'r gorllewin o Borthor. Rwy'n tybio mai'r Ymddiriedolaeth Genedlaethol oedd yn gyfrifol

Cer Edern - rhan o berfa hen glawdd wedi ei chwalu, a danadl poethion breision yn dangos cymaint o wrtaith sy'n llifo i'r allt.

By Edern: scattered stones from an old *clawdd* with flourishing nettles showing how much fertilizer is flowing to the slope.

Peipen yr Ymddiriedolaeth Genedlaethol yn traenio ei thir ei hun – a hwnnw'n dir llawn gwrtaith fel y dengys y llun.

The National Trust's pipe, draining its own land, full of fertilizer.

Tudweiliog - enghraifft dda o ôl nitradau'n llifo fel neidr werdd.

A good example of nitrates flowing like a green snake.

am hyn, gan fod darnau mawr o'r tir yma yn ei meddiant.

Ond gwaetha'r modd gwell na dim byd arall ydyw ymdrechion yr Ymddiriedolaeth. Er y cloddiau mae nifer fawr o gaeau'r Ymddiriedolaeth yn sgleinio'n orchestol o wyrdd gyda pheth hylltod o nitradau wedi eu taenu'n drwch drwyddynt, ac ar y cyfryw gloddiau mae fforestydd o ddanadl poethion balch. All rhywun ond gofyn beth oedd diben i'r Ymddiriedolaeth gyda holl rwysg a chyhoeddusrwydd y bondigrybwyll Operation Neptune fynd ati i brynu'r tir yma, os mai creu peth fel hyn ydyw'r nod. Fyddai unrhyw amaethwr masnachol cyffredin ddim wedi gwneud dim gwahanol.

Fel mae gogwydd y truth hwn yn ei hawgrymu, credaf y dylid bod yn fwy blaengar yn amgylcheddol o ran polisi cyhoeddus. Dylid targedu tâl i ffermwyr am y golled a geid o ddadwneud difrod fel hyn, a thalu mwy na gwerth y golled er mwyn sicrhau bod yr abwyd yn cael ei lyncu. Nid yw ffermwyr ac ni ddylai ffermwyr, mwy nag unrhyw gorff masnachol arall, orfod gwneud pethau amgylcheddol well o rinwedd calon. Nid yw hynny'n gwneud dim synnwyr o ran busnes.

Gyda thargedu â mwy o weledigaeth gellid hyd yn oed ystyried adfer ambell i gynefin a gollwyd neu ymestyn rhai gweddilliol. Nid oes prin ddim rhostir ar ôl ar arfordir gogledd Llŷn - un darn bach yn ymyl Porth Ychain oedd y gorau ar ôl. Ond yn bennaf oll dylai'r coridor arfordirol fod efallai gymaint â chwarter milltir o'r môr gyda sylw yn cael ei roi i'r cyfan hefo'i gilydd a cheisio gwella'r amgylchedd dirywiedig ar arfordir Llŷn ac mewn cymaint o fannau eraill ar hyd y llwybr arfordirol, er na fyddai hynny'n datrys gor-wrteithio ymhellach oddi wrth y môr. P'run bynnag mae bri mawr ar y llwybr arfordir, meddir. Siawns y dylai ei hyrwyddwyr feddwl ychydig am fwy na ffensys preiffion a giatiau cadarn, gan gofio hefyd am un o'r cymhellion pwysicaf dros ei gerdded i nifer fawr o bobl - i weld natur ar ei gorau. Ond ar hyn o bryd nid da lle gellir gwell.

Iwan Edgar: *Brodor o Lŷn, heb symud ymhell - dim ond wedi croesi i Eifionydd, bellach. Yn ymddiddori mewn planhigion a chynefinoedd, ac yn awyddus i weld polisiau mwy blaengar i amddiffyn a hyrwyddo y byd naturiol.*

Green wilderness

The new coastal path along the northern Llŷn coast has little to offer any walkers interested in wildflowers. Despite designations aiming to protect the natural habitats, biodiversity is scarce and there is much evidence of fields squeezed for every last drop of productive value. Docks, nettles and lush grass dominate on over-fertilised field edges. Public policies should aim for better provision for farmers to enable them to restore some of the lost habitats. One way would be to widen the coastal corridor.

All photos: Paul Kay

Gobies - a guide

Painted goby *Pomatoschistus pictus* Gobi lliwgar

Photographs showing diagnostic characteristics are at last making identification of the full range of gobies found in Welsh waters possible. This guide will help anyone interested in these attractive small fishes put a name to a species, although there is still much to find out about Welsh gobies, as ***PAUL KAY*** *and* ***LIN BALDOCK*** *explain.*

Gobies are small marine fishes and there are about 17 species of gobies found around the coasts of Britain and Ireland. Most of these have been recorded from the Welsh coasts. Whilst some are abundant and 'common' in suitable habitats, only a few are easily identifiable. With the use of high-resolution underwater digital photography, this situation is changing. The authors have been photographing gobies for a number of years and are confident that the vast majority can be identified from digital images providing that key features are captured.

Most gobies are bottom dwelling for much of the time, with a few exceptions. As some are curious, they can be photographed relatively easily. A few species are usually seen swimming, but even these will rest on, or in, the seabed at times. Of these, it is the transparent and crystal species which are hardest to photograph, as they are, as their names suggest, difficult to focus on – especially so when they are flitting about in mid-water.

It is difficult to be definitive about the ecology and behaviour of some of the gobies, as is the case for many marine species found in Welsh waters; we still lack a lot of information about them.

Breeding

Male gobies generally choose a nest site and then attract females to it. Black gobies, for example, will often select an old shell, or perhaps a discarded tin, and will then carefully attach the eggs on the inside surface and continue to protect them from predators until they hatch. Other natural nest sites might be narrow crevices in rocks or under boulders, with the eggs laid on the 'ceiling' to avoid them being swamped by silt.

Male black gobies adopt different mating tactics, perhaps dependent on their size. Large males, distinguished by their greatly elongated fin rays, guard a nest to which females are attracted; these are called parental males. By contrast smaller males, which lack such a long fin ray and closely resemble females in colour, may sneak into guarded nests and attempt to fertilise eggs as they are laid – sneaker males. These small males do not guard nests. Similar sneaking behaviour has been recorded for the common goby.

Two-spotted gobies, often seen by divers in small shoals amongst seaweed and seagrass, may lay eggs in narrow fissures which the males can just about squeeze into. Common, painted and sand gobies often choose one half of a bivalve shell such as a cockle lying in soft mud or mixed sediment, where they lay their eggs on the 'ceiling' of the nest. The male selects the site and then entices a female to lay her eggs there by elaborately displaying his colourful fins and by tail fanning. The male will change colour markings very rapidly, depending on the proximity of the female or potential competitors.

Colour

Gobies are very variable in colour indeed. They are experts in camouflage and can match their colour to blend with the habitat. Colour also depends on numerous other factors such as mood: fish displaying during the breeding season show dramatic colour changes which can last only a few seconds. Colours at night differ from those recorded during the day. Whilst colour has often been used as a guide to identify fish, in the case of gobies it is not always a reliable tool due to the fishes' ability to change colour and emphasis of pattern. (This is actually true of many other fish too).

Black goby *Gobius niger* Gobi du

Black goby – Gobi du

The Black goby is a silver-grey to black fish with coarse speckling and blocks of black or dark brown colour along its flanks. Scales on the head are not usually visible. Both dorsal fins have dull red and brown zig-zag stripes and flecks and, particularly in large adult males, the first three fin rays of the first fin can be elongated and swept back in graceful curves. The fish look solidly built with heavy 'shoulders', tapering abruptly from the pectoral fins to the tail. Breeding males may be black all over (hence the name) but this colour is not often seen in the field. Black gobies can be very common over rocky mixed ground or on muddy sediment, where they may even use burrows if no other shelter is available. They can be found from low tide level to considerable depths, in sheltered to exposed habitats. Black gobies are very common in Holyhead Harbour, for example on the muddy sediment off Newry Beach, and small 'gangs' of them roam around Cardigan Bay. They

have been likened to jackdaws in that they travel in foraging and interacting 'gangs'.

The Rock goby – Bili bigog

This goby differs from the Black goby by having silky free rays at the rear of the pectoral fin, usually visible in good photographs. They also have well-defined scales on the top of the head, and the top edge of the first dorsal fin is often a lighter, yellowish or even orangey colour, at least in breeding males. Rock gobies are found intertidally and subtidally down to depths of 20m or more on rocky seabed. They are common in the Menai Strait around the area of the suspension bridge and are most easily revealed by torchlight at night.

This is the goby most likely to be found on the shore in rock pools or under boulders, especially in the spring when they come into shallow water to breed. The rock goby's distinctive pointed eggs are laid intertidally and in shallow water under boulders and small stable rocks, where the eggs are tended by the males.

Rock goby *Gobius paganellus* Bili bigog

Leopard spotted goby *Thorogobius ephippiatus* Gobi mannog

Leopard spotted goby – Gobi mannog

This is a distinctive goby with a steely grey-blue body marked all over with bold orange to chocolate coloured spots. Older fish can be very dark and might then be confused with Black gobies. Crevices in subtidal rocky reefs on moderately exposed to exposed shores from about 5m depth downwards are the preferred habitat for this species. This habitat preference explains why this goby was not recognised as a member of the UK fauna until as late as the 1950s. The dredging methods used at the time to collect fish did not sample this habitat effectively and it was not until SCUBA diving became widely used that it was realised that this is actually a relatively common goby in some areas.

Fries's goby *Lesueurigobius friesii*
Gobi Fries

Painted/Common/Sand/Lozanoi goby complex

The gobies in this group can be difficult to tell apart!

Painted gobies – Gobi lliwgar

They are extremely common and may be seen as they dart and dash around on muddy, sandy and mixed grounds. They are very curious and will approach divers to investigate what goodies the divers might have stirred up. This goby has a brightly coloured first dorsal fin with double transverse rows of black spots, and males have an electric blue margin to the fin. Juveniles tend to occur in mid-water shoals in late summer and early autumn, together with two-spotted gobies. Males will aggressively defend their nests and often develop bold colour marks when approached by a diver.

Common goby – Gobi

These gobies are very similar in appearance to 'sand' gobies but have more of a snub nose and are found in shallow, near-shore, often estuarine habitats. Common gobies do occur together with sand gobies in some areas, making it difficult to distinguish the species. Breeding males can display very colourful dorsal fins with a series of transverse rosy bands.

Sand gobies – Gobi y tywod

This name actually includes two species which occur in Welsh waters: the Sand goby and Lozanoi's goby. The species hybridise with each other which further complicates identification. These gobies are very common subtidally extending into deep water on sandy, muddy, mixed sediment.

Painted goby *Pomatoschistus pictus* Gobi lliwgar

Two-spotted goby *Gobiusculus flavescens* Gobi brych

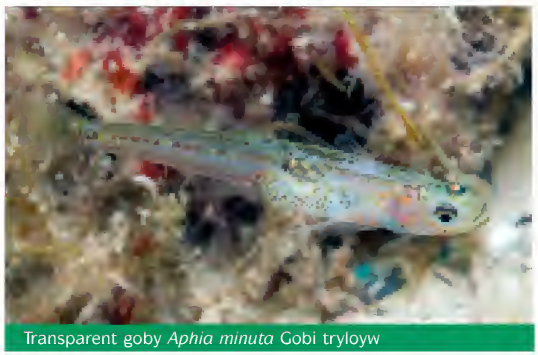
Two-spotted goby – Gobi brych

Whilst most goby species tend to be bottom dwelling, large mid-water shoals of milling two-spotted gobies can often be seen in sheltered waters and rock pools. This goby is very common in shallow weedy habitats over rock, especially from mid-summer onwards, and its behaviour contrasts with other gobies as it is usually seen above rather than on the seabed. When water temperatures drop in winter, these gobies can then be found lying on sediment seabeds or in shallow rock crevices and may have very different colouration from that shown in summer; this behaviour and colour can confuses divers. Late summer fish often carry large parasites.

Diminutive goby *Lebetus scorpioides* *Gobi bach*

Diminutive goby – Gobi bach

These very small (~ 2cm long) gobies are almost certainly under-recorded in Wales. A recent record made by divers from Pembrokeshire, who photographed one during a Seasearch dive, may well be the first photographic evidence of the species in Welsh waters. Not a great deal is known about this tiny fish which is actually bigger than Guillet's goby, for which there appear to be no obvious Welsh records, although it almost certainly lives around the Welsh coasts: Guillet's goby is often found in Horse Mussel beds and these do occur off the north Llŷn.



Transparent goby *Aphia minuta* Gobi tryloyw

Transparent and Crystal gobies – Gobi tryloyw a Gobi gwydraidd

Transparent gobies are reported to occur in Welsh waters and have been photographed in Tremadog Bay but they are probably under-recorded and may well be reasonably common. Both these species tend to be nocturnal which probably explains why they are seldom seen by divers. Furthermore, both are relatively delicate, so when netted they are apt to be easily mangled and may go unnoticed in the catch which again does not help recording their presence.

Jeffrey's and Fries gobies – Gobi Jeffreys a Gobi Fries

These two gobies have been caught occasionally in

Jeffrey's goby *Buenia jeffreysii* Gobi Jeffreys

deeper waters off Wales: so far no records have been made by divers.

Climate change is already affecting sea temperatures and consequently some significant changes are happening to the distribution and abundance of marine life in Welsh waters. This is also likely to affect Gobies. Here are three 'rare' species which might arrive in our waters:

Couch's goby – Gobi mawr: certainly a possibility in the shallow, warm waters of Tremadog Bay, in particular on Sarn Badrig.

Giant goby – Gobi mawr: the nearest records for this species are from the Scilly Isles. It is an intertidal species in the UK, occurring in high rock pools with lots of green algae – sea lettuce and gut weed.

Redmouth goby – Gobi mingoch: there are no British records for this species but it does occur in a range of sheltered to exposed habitats on the south and west coast of Ireland.

Paul Kay *and* ***Lin Baldock*** *have been independently photographing and researching into gobies throughout the UK and Ireland for the past few years and have taken many thousands of photographs of these fish. Dr Lin Baldock is a highly experienced marine biologist and Paul Kay is co-author of* A Fieldguide to the Marine Fishes of Wales and adjacent waters.

Gobïod

Ceir 17 rhywogaeth o gobïod yn nyfroedd Cymru. Mae'r canllawiau hyn yn crynhoi eu nodweddion biolegol ac yn disgrifio rhai o'r manylion y dylech chwilio amdanynt wrth geisio adnabod y grŵp hwn. Mae dyfodiad ffotograffiaeth ansawdd uchel wedi gwneud y broses o adnabod gobïod yn llawer mwy posibl, fel y dengys y ffotograffau a geir yn yr erthygl hon.

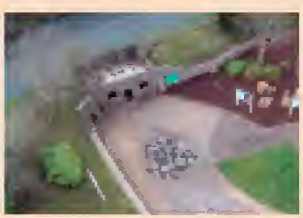
Waters from the deep:

Taff's Well thermal spring

Katrin Raynor

The naturally rising waters are contained within a Victorian well

After a chequered past, the Welsh natural wonder that is Taff's Well is again attracting scientists, historians and the general public. It is a geological-cum -hydrological curiosity, with an intriguing social history, as ***GARETH FARR*** *explains.*



A short train journey from Cardiff, hidden away in a small dilapidated Victorian stone building, is perhaps one of Wales' most unusual natural wonders. Many people will have heard of its name, 'Taff's Well', which is also, and by no coincidence, the name given to the village in which it can be found. Taff's Well is the only thermal – or warm water - spring in Wales, and is one of only a handful to occur in the UK, the Roman Bath hot springs being the most famous example.

A 5,000 year journey

So what makes these waters unique? Primarily it is the temperature: bubbling to the surface, the water maintains a constant 21°C, twice that of a 'normal' spring that you may encounter on a walk in the Welsh countryside, but still less than the 45°C you could expect at Bath. Carbon-14 isotope dating suggests that the rain which feeds the well fell at least 5,000 years ago, at a time when the Welsh population lived, at best, in huts, and brown bears roamed the forests. Rainwater falling somewhere along the heads of the valleys moves slowly underground, via cracks and fissures in the bedrock. The waters then flow to a depth

Gareth Farr

Historic postcard showing the 20th century bathing pool

of several hundred meters, moving southwards under the coalfield and travelling just 5m each year. It is here, deep down below the South Wales Valleys, that the water gains its temperature from the natural geothermal gradient of the earth's crust. Somewhere near Taff's Well the deep water finds a pathway, perhaps a geological fault, which allows the waters to return to the surface for the first time in over 5,000 years.

Healing powers?

There is no mention of Taff's Well in the early pre-1700s literature. The spring waters no doubt existed hundreds if not thousands of years ago but perhaps remained unnoticed or partially submerged by frequent flooding of the adjacent River Taff. As tempting as it is to speculate, there is no evidence to support Roman usage of the site. The first recorded visit was made in 1760 by a German chemist D.W Linden. Bathing and consumption of mineral and thermal waters was growing in popularity, Llandrindod Wells and Builth Wells being good examples of this fashion in Wales. After undertaking an analysis of the waters, Linden suggested that

Margaret Davies and John Williams

A rare still from ciné film footage (c 1940) showing local people enjoying the swimming pool.

consumption of several pints every day would be a good cure for rheumatism and this was perhaps the birth of Taff's Well as a destination for people seeking relief and cure from various diseases. The booming coal industry in the South Wales coalfield and the associated railway infrastructure made travel a real possibility for many people, and a new station at Taff's Well, then called 'Walnut Bridge', allowed direct access for poor and rich alike. The mid to late 1800s was the most popular period for visitors seeking

Katrin Raynor

The well house, built in the 1890s, still covers the well. The River Taff is immediately behind the well building.

cures from the well's water. Many contemporary travel guides and newspaper articles speak of queues of people waiting in turn to bathe in the waters. The well had to be upgraded, and a makeshift wooden and metal structure was erected in the mid 1800s to allow privacy. Men and women had to bathe separately, hanging a bonnet or pair of trousers on the door to signify the well was occupied. Its popularity was such that a stone building – still visible today – was constructed in the 1890s, but not long after this the fashion for bathing in waters diminished, and perhaps the belief in its curative properties, and Taff's Well fell out of favour and into dereliction.

Learning to swim

During the mid 1920s the great depression left many miners and labourers without work and it was these men that were to facilitate the rebirth of Taff's Well. The newly formed 'Taff's Well Spa Ltd' oversaw the construction of an outdoor swimming pool, opened in August 1929 and filled by the naturally occurring spring waters. The pool was an immediate success, offering a safe environment to learn to swim, socialise and relax. The pool remained popular until the 1950s, and when it fell into disrepair it was rescued by a local business man and a 'gang' of local youths called the 'Bath Boys' who kept it going until the late 1950s. The swimming pool could not be sustained and the cost of upkeep was not matched by the income generated by bathers, and once again the well fell out of use and into a derelict state.

The following years would not be kind to Taff's Well. The well and pool became filled with rubble and graffiti was sprayed across the once elegant building. During the droughts of the 1970s the park warden came up with the bright idea of using the water to save the grass of the bowling green. Rubble was removed from the well and the waters, which continued to flow during the long hot summer, were used to save the greens from drought. The temporary rejuvenation of the well stirred up strong local support to re-open the pool and there even for plans to bottle the water, but the dream was never realised. Despite attempts to get funding, the doors would remain closed for next 30 years.

Life in the well

Taff's Well has held onto many of its secrets and to date there has been no formal investigation of what may live in its waters. There are certainly bacteria living off the iron- and manganese-rich waters forming a 'scum' on the surface. The waters are naturally oxygen-depleted and bubbles of almost pure nitrogen rise from the base, so any life must be adapted to these conditions. Samples for diatoms (single cell

Gareth Farr

The water flows out of the well and into the River Taff

algae) are currently awaiting analysis and it is hoped that a 'Biodiversity Blitz' in the summer will find not only interesting species in the surrounding park but also within the thermal waters.

A promising future

My first visit to Taff's Well was in 2008, when the well was flooded and strewn with rubbish. Even in this sorry state the waters captured my interest. A series of scientific experiments (Farr & Bottrell, 2013) helped to raise the profile once again, and works undertaken by Rhondda Cynon Taf County Borough Council alleviated the flooding, allowing access to the building. The doors were reopened for one day only as part of the 'Open Doors' heritage festival and over 300 people turned up to take a look inside (Farr, in press), testament to the appeal of Taff's Well to the general public, scientists and historians. Over the last few years the well has undergone a renaissance, re-inventing itself as an educational and scientific study site used by several universities, schools and interest groups. The surrounding park has been awarded the 'Green Flag' award, no doubt helped by the presence of the well. After 30 years of being closed to the public the well building is now open again, complete with a spectacular lighting and audio show detailing the history of the well. The waters have long benefited the local community and it is hoped that a ground source heat pump will be able to use the warmth of these natural waters to supply heat to the nearby pavilion building.

Taff's Well has once again reinvented itself, from healing spring (1700-1800s), via swimming pool and spa (1929-1950s), to an important scientific and historical asset and, who knows, one day in the future we may even see the return of open air bathing in the warm thermal waters.

Visiting the well

Taff's Well is located in the Taff's Well park just off Cardiff Road, CF15 7PF. If you wish to go inside, a key can be obtained from the on-site park warden. Once inside you can enjoy the bilingual audio-visual display at no cost.

***Gareth Farr** works as a hydro-geologist for the British Geological Survey.*

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Gareth Farr

The well building temporarily flooded in 2010

Dyfroedd o'r dyfnderau

Ffynnon Taf yw'r unig darddell frwd yng Nghymru, gyda'r dŵr yn 21°C cyson. Awgryma dyddio isotop Carbon-14 y disgynnodd y glaw o leiaf 5,000 o flynyddoedd yn ôl, gan ymdreiddio'n araf i lawr trwy holltau yn y creigiau, a'i gynhesu gan gromen y ddaear tan Gymoedd y De. Bu'n boblogaidd yn y 19eg ganrif ar gyfrif ei rymoedd iachaol tybiedig, ac adeiladwyd ymolchfa a phwll yn y 1920au: ond bu iddynt ddirywio'n ddiweddarach. Bu cynnydd diddordeb eto'n ddiweddar, gydag astudiaethau o'r bacteria sy'n byw yn y dyfroedd prin eu hocsigen

Brenda Bullock

Shakespeare's Meadow:

enhancing Radnorshire's Willow Globe Theatre

In rural mid-Wales there exists a remarkable theatre, in a magical setting, made of willow, and staging Shakespeare plays. Yet the wild meadow flowers that the playwright would have been familiar with more than four centuries ago were missing. So a community project was started to enrich the theatre's surroundings with a meadow, as URSULA BOWEN explains.

Radnorshire's Willow Globe Theatre is a smaller version of Shakespeare's original Globe Theatre in London. When the willow foliage grows in summer it forms a lush green backdrop to performances of Shakespeare's plays. A wooden stage and semi-circular rows of seats complete the construction. Part of the Shakespeare Link Charity, the Theatre is situated at Penlanole, an organic farm near Llandrindod Wells, owned by Sue Best and Philip Bowen.

The newly constructed theatre looked magnificent but the surrounding dull, agricultural grassland did not enhance the environment! In Elizabethan times the hay meadows would have been full of colourful wild flowers and wild grasses.

When I suggested to Philip and Sue that it would be interesting to establish a small wild flower meadow around the Theatre similar to the meadows Shakespeare would have seen all around him, they warmed to

Brenda Bullock

Aerial view of the theatre

the idea and the process was started.

Shakespeare's interest in the countryside and its wild flowers and birds is evident in his plays and sonnets, and there is an extensive literature on Shakespeare's flowers. *A Midsummer Night's Dream*, *Hamlet*, *Love's Labour's Lost*, *The Tempest*, *The Winter's Tale*, *Macbeth* and *King Lear* are full of references to wild flowers which would have been familiar to his audience, who would have understood their significance, from perfumed beauty to rankness.

Researching the wild flower species

I undertook a search for the flowers mentioned by Shakespeare in his plays and sonnets and compiled a list of species native to the UK, limited to those species which would grow at Penlanole; for example, maritime species were not included. Species and varieties of garden flowers were also excluded from the list. My compilation lists nearly 70 species of native dicotyledonous flowers but only two native monocotyledons – darnel and rush. Grasses, rushes and sedges did not inspire the bard! However, a meadow, by definition, supports a plant community which is a mixture of flowering plants, grasses, rushes and sedges. I was determined to create a meadow of native flowers and grasses.

At the time the national charity Flora Locale was initiating a programme to boost wild flower meadows in Wales. They wanted to put farmers and landowners who owned flower-rich hay meadows in contact with others who were keen to improve the biodiversity of their impoverished meadows. To achieve this they recommended the donation of either green hay or brushed seed from flower-rich meadows. Unfortunately the very wet season of haymaking and the doubt of adequate compensation for the donors did not promote offers of green hay or the collection of brushed seed. Sourcing local seed proved impossible.

I decided to approach Emorsgate Wild Seeds, a company retailing native wild flower and grass seed. I selected their Standard General Purpose Meadow

James Robertson

Yellow rattle *Rhinanthus major* Cribell Felen

Mixture (EM2). This consists of 20% flower species and 80% grass species, but I decided to increase the ratio of flower to grass seeds to 40% flower seed. I also increased the sowing rate. On the basis of past experience, I thought these changes would achieve a more colourful meadow in a shorter time.

Volunteers were invited to sprinkle the seed and then to gently trample the area to ensure the seed was pressed into contact with the soil surface. The seed sowing took place in March 2008, a month after the topsoil had been removed to reduce nutrient levels (which favour only the most robust grasses and weeds). The area was criss-crossed with buzz tape to keep off the birds and watered by sprays during dry periods. Germination was good but flowering was sparse; however, there was enough colour to please visitors. Increasing the ratio of flowers to grasses and the overall weight of seed per square metre had been successful.

In October 2008 some Yellow Rattle seed was sown on bare patches of soil between the grasses.

Yellow Rattle is a partial parasite on grasses and reduces their vigour, favouring the growth of the wild flowers. Low nutrient levels and Yellow Rattle are the two key factors controlling the growth of grasses. The germination rate of Yellow Rattle declines rapidly with time so it is best to sow seed as soon as possible after its production. Our seed, bought from Emorsgate Wild Seeds, had been produced during the summer of 2008 and was sown in October of the same year.

For additional security, we decided to germinate some wild flower species in seed trays and plant out the subsequent plug plants. Volunteers joined in discussions to select the species from the list of Shakespeare's Flowers. It soon became obvious that some hay meadow flowers not mentioned by Shakespeare were favoured by volunteers, so to keep their enthusiasm we included a few common species which Shakespeare would have seen in the meadows around him. One of these was Ox-eye Daisy. Seed of twenty-four species was purchased and the volunteers grew these over the winter of 2008/2009 in a cold greenhouse, polytunnel or outside. In spring and summer 2009 the plants were planted in the meadow. Both methods of establishing plants, from seed and plug plants, have been successful.

Management

Traditionally hay meadows are cut in late summer, from mid-July onwards. Over the centuries farmers have decided that the correct time to cut is when they can hear the seeds in the fruits of the Yellow Rattle rattling! This is still a good indicator. Hay meadows should be cut when the flowers and grasses have finished flowering and produced seed – cutting will spread the seed which will continue the next year's crop. Light grazing over the winter months returns a modest dose of nutrients via the animal faeces, and their trampling presses the seed into contact with the soil. Grazing stock within the Willow Globe enclosure would damage the willows, so this is a problem to be solved in the future.

In 2008 the growth of flowers and grasses was so slight we decided not to cut. Subsequently the meadow has been strimmed in September – after Apple Day, so that visitors can enjoy the last of the wild flowers. After

cutting, the dead plant material is left for a few days to drop its seed and is then raked off.

An annual survey of the presence and absence of species of wild flowers and grasses is carried out from May to September to monitor the progress of the meadow.

Year	Species
2006	17
2007	19
2008	11*
2009	36
2010	39
2011	48
2012	52
2013	53

*Low count due to removal of 6 inches of soil and its vegetation

In such a small area there may be swings in abundance of particular species so that some may need control by 'weeding out' and others may need support by reseeding or planting plugs. Around 23rd April 2014 (Shakespeare's 450th birthday) the meadow was covered with cowslips – the descendants of about 6 plug plants planted in 2009.

Species from the newly created meadow have colonised other parts of the enclosure and the regular strimming of the paths and collecting areas for people has reduced the abundance of the tall agricultural grasses, contributing to this process.

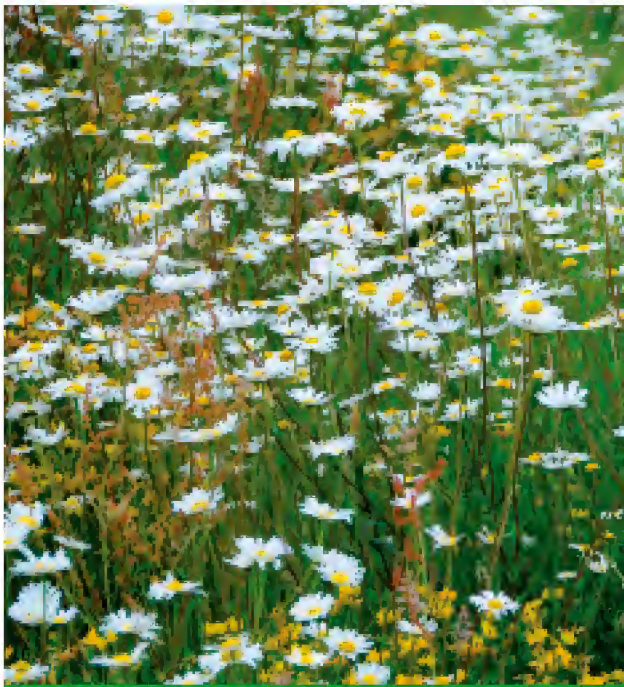
During a performance of *A Midsummer Night's Dream*, the actors decked themselves in modest garlands made from the flowers in the Shakespeare Meadow. From early May, through June and July, the meadow is ablaze with colour and continues in muted tones until Apple Day in September. Visitors comment on the changing colours during the summer and from one year to the next. Walking by the Shakespeare Meadow is the prelude to the performance of a play in the Willow Globe Theatre. It is our floral tribute to the bard!

More information at **www.shakespearlink.co.uk**

Acknowledgements
I am grateful to Sue Best and Philip Bowen for their enthusiasm and continuous support for the project during these past 10 years; Professor Mark Williamson for advice on reducing soil nutrients; Dr. Becky Nesbitt for advice on Willows; Roger Green for sympathetic strimming of the enclosure; and the large number of volunteers (too many to mention individually) who have contributed practical help and advice.

Ursula Bowen *was formerly a principal Lecturer in Ecology and Wildlife Conservation at Oxford Brookes University.*

Brenda Bullock



Ox-eye daisies *Leucanthemum vulgare* Llygad-llo mawr

Dôl Shakespeare

Mae dôl flodeuog a grybwyllir yn nramâu Shakespeare wedi'i greu mewn theatr yn y canolbarth, fersiwn llai o Globe Theatre Shakespeare. Y syniad y tu ôl i'r cynllun cymunedol hwn oedd sefydlu dôl fechan llawn blodau y byddai'r dramodydd yn gyfarwydd â nhw. Golygodd hyn dynnu uwchbridd, hau cymysgedd hadau blodau gwyllt ion, a magu rhai planhigion i'w plannu'n uniongyrchol. Pob blwyddyn ers hynny, mae gwirfoddolwyr wedi arolygu rhifedi planhigion y dolydd, a phob blwyddyn mae'r nifer wedi cynyddu, gan gyrraedd 53 y llynedd.

Ivor Rees

Turning tides and turbulence

Tidal turbine at Strangford Lough, N. Ireland

Earlier this year the 5th Marine Energy seminar was held in Pembrokeshire, followed by the annual Cymru Renewable UK conference in Cardiff City Hall. These conferences were packed out and generated a buzz, as they discussed technical solutions to deliver renewable energy. Can this be done without harming our environment? VICKY MOLLER argues that this is a challenge that environmentalists must engage with.

On 1 May I attended the annual Cymru Renewable UK conference in Cardiff City Hall. In addition to the core issues of wind, water and solar generation, the Conference has expanded this year to cover issues such as energy storage, including compressed air and hydrogen, smart grids, biomass, transport, civil engineering and grid development. The wave and tide sector held its own annual conference a month earlier, more of which later, and renewable heat is also following a separate meetings orbit.

So what does this mean for nature in Wales? Renewable energy is about harvesting the power of nature, primarily the sun through winds, light, waves, biomass and the hydrological cycle, and also the moon through tides. Fossil energy is about harvesting the sunlight of millenia, through burning the life it created. It was the generations of ancestral plants that locked up enough carbon to create an atmosphere fit for animal life on earth. Burning our plant and animal ancestors unravels the process and threatens to cremate our unborn descendants.

Renewables are a tool in the escape from this doom. Without them there is no hope, though with them just a glimmer. In order not to commit species suicide earlier than necessary we must bin the nature-versus-development mindset and instead collaborate to develop the most suitable renewables as fast as possible to replace fossil fuels and 'de-carbonise' energy production. If wildlife's human advocates do not do this but simply impede this shift, they will be marginalised by jobs-hungry politicians, to the detriment of wildlife.

Renewables UK Chief Executive Maria McCafferty, pointing to the marble cherubs overhead, said this Edwardian civic splendour was built to last, and we are here to build energy to last, long past the fossil era. The participants brought a cornucopia of inventive thinking to the conference. From smart use and lighter materials to reduce energy hungry and polluting rare metals, to a shared ethos in which rivals subsume their protectiveness to realise the benefits of open source and collaboration. This will be necessary to overcome real environmental issues, such as the embedded energy costs of some renewables; solar PV and energy crops using up productive land and undermining food security; and, of course, issues arising from tidal and wave energy at sea, a sector which had just held its own annual seminar.

Renewable energy at sea

The 5th Marine Energy seminar took place in Pembroke Dock in March. I was swept off on a breathless journey through mind-stretching technical possibilities – some existing, some on the drawing board, the majority at working model stage.

Why such enthusiasm? Wales is a slip of a nation

Vicky Moller

The Cymru Renewable UK conference

skirted by sea with exceptional power potential in its tide, waves and wind. While our weather patterns are erratic the tide is not, it is regular as clockwork. Sea water is nine times denser than air, so much smaller turbine blades under the sea produce a far more constant output than wind turbines. It ought to be relatively straightforward to harvest this energy. Yet Wales is still awaiting its first tide or wave turbine despite over 15 years of spending on them.

Engineering low carbon solutions

The resurgence of interest in tidal energy began in Pembrokeshire with a dedicated marine engineer, Richard Ayre. Back in 1999 he designed an underwater turbine, the Delta Stream. Funded by Welsh government, a small-scale version was deployed and powered a local boatyard. Since then many millions have been spent, both in pounds and hours, to reach the next stage. A larger but still sub-commercial model is to be deployed in Ramsey Sound this August for a trial year. It will produce 400kw – the first sea water renewable generator in Wales.

Hard on the heels of the Delta Stream coming to Ramsey is the Skerries Tidal Stream Array bound for the rocks off Anglesey. It looks quite different to Richard's Delta stream, its blades are on an arm that can be slid up the pole to the surface for maintenance work. The design has been in action in Strangford Lough, Northern Ireland. The Skerries turbine will produce 10 Megawatts, and is the

Mel Parry

Tidal waters around the Skerries off the coast of Anglesey, a potential source of renewable energy

biggest yet of its kind. It took just four years to get planning, which qualified it for finance including the Euro £1million awarded only last month.

The simple fact is that we need to leave fossil fuels. It isn't just climate, though that is more than reason enough; there is no moral excuse for destroying nature's fossil legacy created over millions of years, never to be made again, leaving future generations with nothing, not even the skills or the tools to live without it. That, one hopes, is why Wales is enacting the Future Generations Bill, to enshrine equity between generations into law.

The engineering sector loves a challenge. Living on fossil fuels was too easy; renewable energy requires serious ingenuity. There are sparks of light in the mist. Instead of it being either renewables or marine wildlife and habitats, it has to be both. For example, tidal and wave devices stop beam trawling in the vicinity, potentially creating sanctuary areas for sea floor habitats and for fish to breed. I see the door open to share goals to meet nature's needs along with ours, as we once did, if only in a tribal dream.

__Vicky Moller__ is a long-standing environmental campaigner who has run community renewable energy projects in Pembrokeshire.

Pŵer Ilanwol

Mae dichon i'r dyfroedd Ilanwol ogylch Cymru gynhyrchu peth wmbredd o ynni adnewyddol. Mae'r Ilanwau'n gyson, lle nid yw'r haul na'r gwynt ddim. Mae angen Ilafnau tyrbin Ilai o dan ddŵr er mwyn cynhyrchu ynni. Dylai cynaeafu'r ynni hwn fod yn rhwydd, eto mae Cymru'n dal i ddisgwyl canlyniadau, er gwaethaf 15 mlynedd o ddisgwyl. Mae ei ddyfodol yn dibynnu ar ewyllys gwleidyddol a newid agwedd, gan roi'r gorau i ddibynnu ar danwyddau ffosil. Ni all treillrwydi trawst weithredu yn ymyl dyfeisiadau Ilanwol, a dichon i hynny greu noddfeydd ar gyfer bywyd gwyllt morol.

New diatom species described from Wales

Diatoms are microscopic algae which possess a cell wall made of silica with intricate patterns and structures. These vary between species and genera and are used for identification. Diatoms live in all types of freshwater, in the sea, and in a variety of moist places. Some species occur only in pristine habitats, while others live in polluted water or can tolerate high acidity. Diatoms are hence frequently used to monitor water quality to identify problems such as nutrient enrichment and acidification.

In Wales streams in the catchments of the upper River Wye and the River Irfon have been surveyed since 2003 to monitor the recovery from acidification following the application of lime. Abundant species included well known taxa such as *Achnanthidium minutissimum*, which occurred in streams that were not acidified or had recovered from acidification after liming, and *Eunotia exigua* which is highly tolerant of low pH.

In 2013 a new species in the genus *Gomphonema* was described that frequently occurred in the monitored streams of the Wye and Irfon catchments. Although the new species is morphologically similar to two other species, *Gomphonema parvulum* and *Gomphonema exilissimum*, they differ markedly in their ecology. The latter two species occur in nutrient-rich waters, and oligotrophic, non-acidified waters respectively. It is important to distinguish between these three geographically widely distributed species. If they are confused, waters would be misclassified in ecological status assessments. To achieve good results in ecology, the taxonomy needs to be correct.

Amgueddfa Cymru-National Museum Wales

Diatom *Gomphonema variorduncum*

The new species was called *Gomphonema varioreduncum*, referring to its shape. Cells in the genus *Gomphonema* are generally club-shaped (clavate). Unlike the other species, the new species is slightly asymmetrical with head and/or foot pole deflected, and the margins of the cell wall are often unevenly curved. The cells of the new species are 13-28 µm long and 4-5 µm wide. The central slit in the cell wall, called the raphe, is slightly undulate and terminates in small, drop-like, slightly deflected central endings. There are 14-18 striae in 10 µm which consist of half-moon shaped perforations which can only be seen in the scanning electron microscope. There is also a pore field at the foot pole composed of round so-called porelli. In the living cell these pores secrete a mucilaginous stalk.

Gomphonema varioreduncum has a wide geographical distribution. It has been found in streams, lakes and small pools in Austria, Finland, France, Germany, Ireland, Norway, Scotland, Sweden and Wales, and there are reports from North America and Russia. In Wales the species occurs in slightly to moderately acidic waters, and many of the sites were close to conifer plantations. The species does not, however, occur in strongly acidified habitats or metal-contaminated waters downstream of abandoned mines.

Reference

Jüttner I., Ector L., Reichardt E., Van de Vijver B., Jarlman A., Krokowski J. & Cox E.J. 2013. '*Gomphonema varioreduncum* sp. nov. a new species from northern and western Europe and a re-examination of *Gomphonema exilissimum*.' Diatom Research 28(3), 303-316.

Ingrid Jüttner, *Department of Natural Sciences, Amgueddfa Cymru – National Museum Wales.*

Green **Bookshelf**

Feasting, Fowling and Feathers. A History of the Exploitation of Wild Birds
Michael Shrubb
T & AD Poyser
London 2013
256pp
Hardback £50

This book is both astonishing and appalling, often in the same sentence. It is astonishing for its sheer detail and for the vast figures recorded on pretty much every page. An average of 5,184,000 larks past annually through Leipzig markets during the 18th and early 19th centuries - the highest of many shocking figures quoted for lark consumption. Such figures reflect the appetite of Europeans for hunting long after agriculture could have provided for their nutrition. The book is appalling for the sheer relentlessness of the culling and sometimes for the methods used.

Mike was awarded the Lifetime Achievement Award of the Welsh Ornithological Society for his painstaking research and editorship of *Welsh Birds*, and his earlier books include monographs on kestrel and lapwing, and two books on how land-use has affected farmland bird populations over the centuries. This book, crammed with details and numbers, is a fitting last tribute to his tenacity and control of detail, his willingness to explore off-beat sources, and his ability to draw it all into a structured record. Sometimes Mike's sonorous voice rings out of the text, as when he describes writings on current Inuit hunting methods as politically correct bunkum.

For all the detailed research, however, the consequence of this exploitation of wild birds is not fully explored. Of course we have limited data on historic bird populations and there is discussion of the decline and extinction of wetland species such as egrets and cranes, but there is no mention of what is occurring now in the Mediterranean. Furthermore, there is only limited exploration of what is sustainable exploitation of a wild population and just a paragraph on the 'Tragedy of Commons' scenario. These are missed opportunities.

John Lloyd

Bird Atlas 2007-2011
Balmer, et al
BTO Books, Thetford 2013
720 pages
£70.00
Hardback

A massive book by any standards, *Bird Atlas 2007 -2011: The breeding and wintering birds of Britain and Ireland* measures 12.5 by 9.5 inches and weighs in at 3.5 kg. Incredible, when one realises the results of five years fieldwork by over 40,000 volunteers were brought together in barely two years, what a triumph for all concerned. Some £1.5m was raised for the Atlas work, the biggest segment coming from British Trust for Ornithology members and BTO Garden Bird Watchers, ringers and other supporters.

There have been three previous bird atlases covering Britain and Ireland. The first recorded breeding birds 1968-72, the second winter birds 1981-84, the third, breeding birds 1988-91. The new Atlas is groundbreaking as it combines both breeding and wintering birds.

Regional organisers were appointed for each county. In Wales, some 32 distributed across 15 counties, Glamorgan being divided into three, Clwyd into two. In addition to the army of volunteers, a fieldworker was employed in Wales in Year 4.

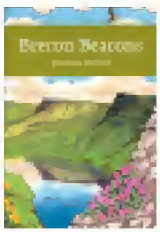
Following the preliminaries, which take 95 pages and include 'Setting the Scene', 'Coverage' and 'Effort', comes 'Pattern and Change in the British and Irish Avifaunas over a 40 Year Period', a chapter which draws out the changes that have taken place since the first Atlas. Here one can see at a glance the winners and losers: red kite, buzzard and raven with staggering breeding range expansions: others like the turtle dove and corn bunting whose ranges have contracted. A series of maps show the changes of abundance for nine groups of breeding species – a shift north-westwards in several cases, while raptors and wildfowl have increased in the south and east.

Then to the heart of the book, the species accounts: two pages for the regularly occurring species, including at least six maps – breeding season distribution, change and relative abundance, and then similar for winter. Maps to ponder over – I must admit to finding my magnifying glass useful, as I marvelled at the results of all that fieldwork. One fact to share with you: the wren is our most

widespread bird, occurring in 96% of 10-km squares in both summer and winter.

What will the next 40 years bring? Meanwhile every reader should obtain a copy of the Atlas; this is indeed a landmark publication in every sense of the word, deserving of a special place on your bookshelves.

David Saunders



Brecon Beacons
Jonathan Mullard
Collins New Naturalist Library 2014
Hardback £55, paperback £35

A few years ago Jonathan Mullard wrote an article about the writing of a New Naturalist regional title, and I wrote an enthusiastic review of his new book. In fact that was in 2006 (NC 18 & 20), and he was writing about Gower. His new regional title, launched at the Hay Festival in May, tackles one of the three Welsh National Parks. Again he has provided us with an account of the writing of his new book; I need to add little in this review except my appreciation of his achievement.

The Editor's Preface notes the challenge facing authors of regional titles, which is how to reconcile the necessary broad explanation of the character of the landscape with the marshalling of a huge volume of detailed information in a balanced way. Jonathan Mullard's article is revealing of how he achieves this difficult feat – by keeping in mind a number of important guiding rules.

This is very much a natural history, representing the interests of nature in the landscape, but I found it hugely enriched by the weave of human history into the story. I had forgotten that the Welsh word for shepherd (in English, the business of herding sheep), in Welsh is *bugail* which was derived from herding of cattle (buwch), once dominant in the uplands. There are numerous insights like this that lift the text. In my review of *Gower*, I noted Jonathan Mullard's knack of presenting a wealth of scholarly detail with a lightness of touch and clarity. Perhaps unsurprisingly he has performed the same trick again.

After setting the scene and underlying geology, a synthesis in the chapter on creation and loss discusses everything from ancient history to the impact of the Victorians, medicinal plants, historic parks and gardens, the industrial legacy and a host of other human imprints on the landscape. Later he describes the land-use picture in a chapter on farming, before looking ahead. In between are chapters on the various habitats, including a chapter on woodlands and one on ancient and special trees; he gives a thorough account of the important cave systems of the Beacons and turns his attention to the natural life associated with chapels and churches. Throughout he makes the text deeply informative but still engaging. Reading his article in this edition will offer a taster of what you can expect from this fine addition to the literature of an inspiring Welsh upland landscape.

James Robertson

Dros y Don: Blwyddlyfr Enlli
Across the Sound: Bardsey Yearbook
Bardsey Island Trust 2014
86 pages £5 inc P&P

If you have crossed the Sound, or are planning to do so, you'll be delighted with 'Across the Sound'. It is the Bardsey Island Trust's first ever Yearbook, covering events on Enlli in 2013. It is fully bilingual, with lots of excellent photographs including a centre-spread of all the islanders. These are the Observatory staff, the Porter family at Ty Pellaf, Christine and Ernest Evans, their son Colin (the boatman) and his daughter Gwen.

Different chapters cover topics such as recollections of the years since the Trust's creation in 1979 (Christine Evans), the farming year (Jo Porter), the Carreg Fawr Project (restoring the paintings which Brenda Chamberlain applied directly to the interior walls in Carreg), thoughts on Retreats and the spiritual life of the island (Rev'd Susan Blagden) and the work of the Bird and Field Observatory (by Steve Stansfield, in his 16th year as Observatory Warden!). Emyr Roberts, the Trust's Warden on the island, retired at the end of the 2013 season and there is an appreciation of his work.

You can buy copies from the Bardsey Island Trust website shop, go to www.bardsey.org or call 08458 112233.

Geoff Gibbs

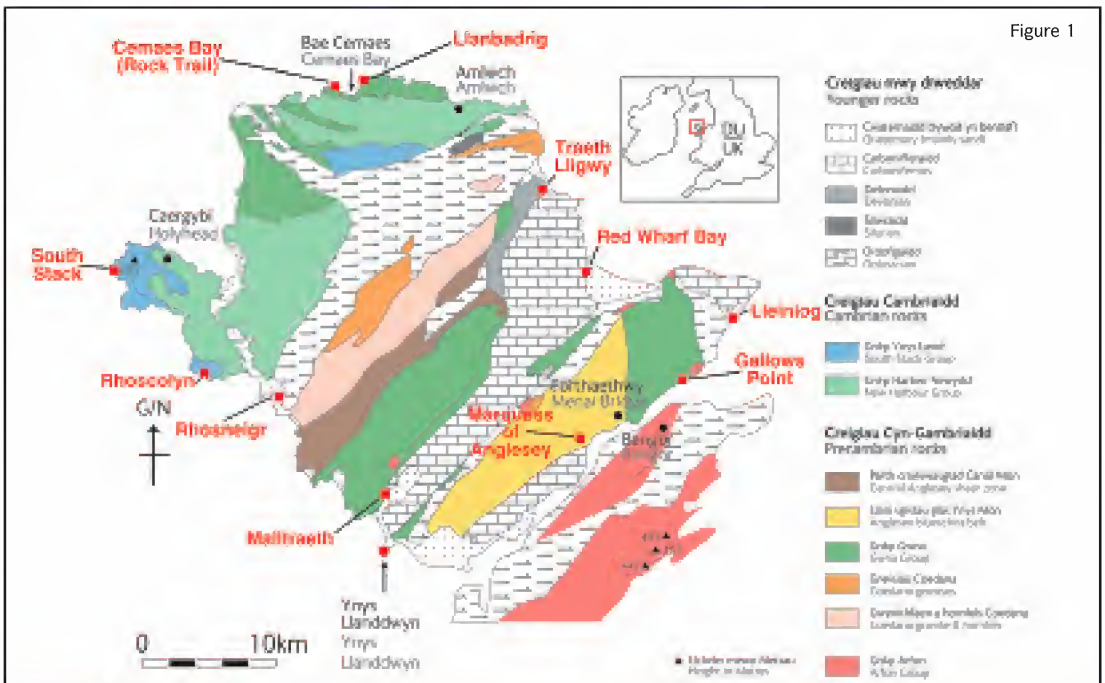
GeoMôn launches geoboards and rock trail

The European Geoparks Network (EGN) was founded in 2000. Initially comprising just four Geoparks – from France, Spain, Germany and Greece – by January 2014 it included 58 members and continues to grow. A European Geopark is a territory with a special geological heritage which can support sustainable economic and social development. GeoMôn, the Anglesey Geopark, was formally recognised by the EGN as a European Geopark in 2008 – an accolade recently endorsed by UNESCO. Anglesey can now boast being a Global Geopark!

Over the last six years GeoMôn has used the island's outstanding geological heritage – a rich diversity of rocks extending back over a billion years and encompassing all but two of the commonly recognised geological periods – to promote geotourism and education for the benefit of the island's economy. Its most recent project has been to develop a series of geological information boards (geoboards) at key sites on the island. In partnership with Isle of Anglesey County Council (IoACC) and Natural Resources Wales (NRW), the Geopark has erected geoboards at 13 key sites, covering everything from the evolution of ancient life in the Precambrian to glacial landforms and deposits of the Ice Ages, and even the formation of the 'Isle' of Anglesey itself, as recently as 5,200 years ago, with the creation of the Menai Strait.

The geoboards are found at some of Anglesey's most iconic geological sites, many of them Sites of Special Scientific Interest, including Llanddwyn Island, Rhoscolyn and South Stack. Standing mostly on or close to the island's coastal path, the locations were chosen to give visitors the best opportunity to see special rocks from each of the major geological periods at spectacular, easily accessible sites. Showcasing the Precambrian Period are the magnificent pillow lavas and mêlange on Llanddwyn Island, the much-visited blueschist underneath the Marquess of Anglesey's Column and the oldest fossils in Wales at

Figure 1



Anglesey Geoboard locations

Professor S. Maruyama and Dr M Wood

Stewart Campbell

Mélange on Llanddwyn Island

Llanbadrig. Cambrian highlights include the magnificent folded strata at South Stack and Rhoscolyn – the latter used by numerous geological students to learn the difficult arts of structural geology and field mapping. The Ordovician and Silurian periods are expounded at Rhosneigr and Parys Mountain, while Devonian deserts and Carboniferous tropical seas are neatly covered by the geoboard at Traeth Lligwy. Other highlights include ancient potholes at Red Wharf Bay, the Millstone Grit at Malltraeth and spectacular Ice Age sediments and erratics at Lleiniog.

The Geoboards follow a standard format – a welcome in seven languages, a fully bilingual Welsh/English account of the key site features and an explanation of the Geopark status. All the boards are profusely illustrated with photographs and simple diagrams, and some also contain trails that visitors can follow. Constructed mostly as waist-high, gently angled plinths, they have been designed to be robust yet unobtrusive in the outstanding landscapes where they are located.

To accompany the boards, a Rock Trail has been constructed on the village green (Bonc y Mor) in Cemaes Bay. Nine small rock plinths each carry representative rocks from the major geological periods present on the island, with a small bilingual plaque giving details of the rock types and their ages. In addition, IoACC and GeoMôn will soon publish a simple guide to the geology of the island, *Footsteps through Time*.

The boards and Rock Trail were officially launched on 19th April. The festivities started with a procession, led by the Cambria Band, from Cemaes Bay to St Patrick's Church in Llanbadrig. Here Albert Owen MP and Dr Margaret Wood, Director of GeoMôn, launched the geoboard and the newly constructed viewing platform for St Patrick's Cave and Well. The latter is the culmination of many years of work by Cemaes Bay Community Council and GeoMôn with its partners IoACC and NRW. Generously facilitated by the landowner, the National Trust, the new platform allows the historically famous site to be seen safely for the first time and extends excursions along this section of the coastal path to take in some outstanding geological features and cultural heritage.

Following the ceremony here, the party and Marching Band returned to Cemaes Bay for the launch of a Time and Tide Bell. Created by sculptor Marcus Vergette, this important landmark tolls as the tide reaches the back of the bay. It is very much a partnership effort, with Marcus conceiving and providing the bell, the Community Council funding its installation and Horizon (Wylfa Nuclear Power Station) providing technical assistance with its installation. Moving on, the party came to the headland and green in Cemaes Bay for the launch of the two geoboards, stone tables and benches and the Rock Trail. Rhun ap Iorwerth AM did the honours, recognising the hard work of GeoMôn and its partners and the outstanding community spirit and effort of the people of Cemaes Bay. Festivities were concluded with excellent local hospitality in the village hall.

***Stewart Campbell**, Natural Resources Wales.*
***Margaret Wood**, Director GeoMôn, Anglesey Geopark*

Pembrokeshire's Seabird Islands: past, present and future prospects Conference Report

On 3rd April 2014, co-incidentally the day that the first puffin set foot back on Skomer for the summer, some of our most renowned seabird and marine researchers from across the UK gathered at Cardiff University to examine the critical role of long-term studies in addressing present and future challenges in marine and seabird conservation.

Topics ranged from long-term monitoring studies established for many decades, to truly novel research techniques, each having a critical role in understanding change and mitigating harm in our environment.

We were fortunate to be joined on the day by Iolo Williams. Iolo drew attention to the massive responsibility we in Wales hold within Europe for our seabirds. Over half the world population of Manx Shearwaters occurs in Wales, mostly on the Wildlife Trust's Skomer and Skokholm Islands. Our duty of care to monitor and protect these populations cannot be overstated.

Professor Ben Hatchwell from the University of Sheffield set the scene for the day, describing how the incredible longevity and slow reproduction of many seabirds mean that the impact of catastrophic events may take many years to manifest itself in full. Truly understanding population change requires intensive data gathering and analysis of breeding success, adult survival rates, and population size.

Professor Chris Perrins from the Edward Grey Institute for Field Ornithology in Oxford went on to describe studies of Manx Shearwaters, birds which are challenging to study as they are nocturnal and breed underground. A major worry is that 'all the eggs are in one basket': with so many of the birds in so few locations, anthropogenic threats from oil spills or the introduction of predators such as rats make the populations fragile. Time-consuming and costly census work has demonstrated an apparent increase in their numbers, from which one might superficially conclude that we are fulfilling our obligations. However, assumptions based on numbers alone can be dangerous; the long term studies have also shown that since the 1960s there has been a significant reduction in the mean weight of fledglings, with a likely concomitant reduction in their survival.

Chris Gomersall (rspb-images.com)

Manx shearwater *Puffinus puffinus*
Aderyn drycin Manaw

He also described the perilous condition of the islands' Lesser Black-backed Gulls, with the world population of the UK's subspecies *graellsii* at only 180,000 pairs. JNCC-funded monitoring has shown a population decrease on Skomer from 20,000 pairs to only 8,000 over the last 25 years. There is no single clear explanation for this, but the lack of appropriate food appears to be a factor.

The key role of long term studies in detecting early signs of such change was emphasised again and again by our speakers. It was also demonstrated clearly that a census of numbers is only a small part of the story, and that establishing the cause of change is key. At a time of austerity it will be essential to keep the long term view, and recognise that these well established, uninterrupted datasets are not only incredibly valuable now, but may be important to us in the future in ways that we currently cannot conceive.

The event was organised by the Wildlife Trust of South and West Wales, Natur, Cardiff University and the University of Sheffield. We would like to offer a big thank you to all the other speakers, including Mike Alexander on management planning, Professor Tim Birkhead on Guillemot monitoring and seabird wrecks, Phil Newman on the Skomer Marine Nature Reserve, Dr Tom Webb on fish in the Irish Sea, Dr Matt Wood and Dr Rob Thomas on research and monitoring of storm petrels, and Dr Steve Votier on gannets. All the talks are available online on Youtube – Pembrokeshire Islands Seabird Symposium.

***Dr Lizzie Wilberforce** is Conservation Manager, Wildlife Trust of South and West Wales.*

Habitat management - coastal grassland

As independent conservation managers and consultants, a lot of our practical work is carried out during the winter while we reap the rewards during the summer months - and this is certainly the case with one project we have worked on for the past two years. The Ceredigion Coast (Cardigan Bay SAC) is particularly special to me. It holds many childhood memories, was a place of exploration as a young adult, and two years ago we were asked by the National Trust Ranger, Gwen Potter, to quote for work to help preserve the grassland and maritime heath We arranged to meet at Cwm Tydu car park. When we arrived there were a couple of volunteers on the beach keeping an eye on a young seal pup hidden amongst the rocks. Having arrived a bit early, as we waited we watched the mother seal swim into the bay and flop her way up the beach to feed her baby, before heading back out to sea. Even if the job hadn't worked out, just going out to quote was worth it!

Coastal grassland is exposed to extreme weather, located in a harsh environment, and access for farm machinery is often difficult due to the slopes and proximity to the cliffs. This means that there are areas of the coast that have never been agriculturally improved, but which remain rich in flowering plants and the wildlife they support.

We were asked to quote for removing some of the gorse and bramble that was encroaching onto the grassland and heath. Although gorse is an important component of heathlands, it reproduces by sending out branches which then root, and also by seeds which spread easily. It can become invasive. Being a 'nitrogen fixer', gorse can enrich soil where it grows, and leaves an accumulation of extensive, deep, gorse litter, threatening more sensitive species. National Trust volunteers had already done a lot of work in cutting areas of gorse, but there were still large stands remaining.

Our contract was part of the ongoing management of coastal acid grassland and maritime heath. During the winter of 2012-13 we worked on the slopes just north of Cwm Tydu. Bramble and low gorse were mulched using a 4-foot wide, low-impact tractor and flail, leaving the fine arisings to be blown away by the wind. The flail is shorter than the topper and able to work carefully between rocks and other features. The more sizable gorse had to be cut by hand with a chainsaw, and was stacked on top of or under the living gorse to break down. Stumps were carefully and individually treated with a herbicide to prevent regrowth.

We cut tracks through larger stands of gorse to create a mosaic, and to encourage a greater diversity in age structure of the gorse. This allows the native ponies and other stock to move about within the stands to nibble at fresh growth, to control regrowth and manage the grassland or heath plants.

We were very pleased to be asked to return to Cwm Tydu by the National Trust the following winter, and then to Mwnt and Lochtyn near Llangranog. This year we focussed on reducing areas of mature gorse.

Ivy Denham

It might look drastic, but it's all to the good

This heavy work was carried out in pairs for safety reasons, but also to share the burden of such work. One person cut the mature gorse on the slope with a chainsaw, the other dragged the cut material to the designated piles for disposal. Both jobs are physically demanding, whether bending down under spikey gorse and walking on slopes wielding a chainsaw, or dragging heavy cut material up or down slopes for stacking. Technique and determination are required, as throwing a large, heavy gorse bush into a strong sea wind can be physically challenging and at times highly entertaining.

However, on the last day of work at Lochtyn this year, in sunshine, meeting interesting and interested walkers, looking out across Llangranog and the bay - could there really be a finer place to work, whilst doing good for biodiversity and saving on gym membership? Hopefully more of this beneficial work will be carried out on these important habitats under the Saving Our Magnificent Meadows Project, led nationally by Plantlife.

Ivy Denham
www.conservationandtrees.co.uk

Expanding responsibilities at sea?

An exceptional series of storms and tidal surges dominated environmental news all the way from mid December 2013 to the end of February 2014. Long swell waves packed with energy colliding with sea-walls made great backdrops to TV reports but told little about the resilience or otherwise of natural habitats. Some initial observations of effects on coastal habitats and species were compiled by Natural Resources Wales (NRW) staff just before the Spring 2014 *Natur Cymru* went to press (extra photos on web version). Longer term consequences and rates of recovery will only become clear after more detailed surveys and repeat monitoring. As I write in early April, NRW are making more comprehensive assessments of morphological changes to the coast and ecological impacts. As expected, embryonic fore-dunes can be seen starting to build against the eroded dune cliff faces. The normally large populations of the semi-terrestrial sand-hoppers *Talitrus saltator* must have taken a hit but, as opportunists, should bounce back. Later in the summer it will also be interesting to see if there are fewer annual flowering plants such as Prickly Saltwort *Salsola kali*, Sea Rocket *Cakile maritima*, and Frosted Orache *Atriplex laciniata* at the topmost parts of beaches. Even to the casual observer it was apparent that abnormally large amounts of seaweed (both the Fucoid wracks and Laminarian kelps) had been torn off right down to their holdfasts, to accumulate on strand lines. Many rocky shores now appear abnormally bare of weed and small mussels. In places the rocks even look polished. Storms like those experienced last winter demonstrate once again that erratic rare events can cause greater ecosystem shifts than decades with lesser forces. The wisdom of maintaining surveillance monitoring programmes is clear.

The annual RSPB Beached Bird Survey happened to coincide with the peak of a seabird wreck. Around Wales, the numbers of adult Razorbills succumbing was out of proportion to the size of local breeding populations. Monitoring that could show the significance for auk breeding populations could be hampered by ill-timed loss of support for long-term studies at Skomer. Just collecting enough data to tick boxes for EU Directives or periodic traffic-light-style reports is not enough to allow understanding of unexpected change. The broader environmental constituency will no doubt be sensitive to any signs that NRW is repositioning risks and degrading scientific capacity built up under the CCW banner.

While the storms made headlines, another marine issue almost slipped under the radar. Among the Silk Commission recommendations was that the remit for conservation in offshore waters be transferred from Westminster to Cardiff. Currently NRW only has responsibility for wildlife matters within the 12 nm territorial waters line. A host of complications have emerged in recent years as different approaches to conservation issues were taken each side of the line. With several major renewable energy projects well offshore, casework on impact studies also needs to be consistent right through to cable landfalls. The Silk proposal may have logic but it would double the sea area to be covered and require extra support to work further offshore in deeper water. Is the will there to provide resources to match territorial ambitions?

Following the unhappy saga two years ago concerning Marine Conservation Zone consultations, readers may recall that the Minister pulled the entire Welsh series. A group was then sent away to review the effectiveness of the existing spectrum of so-called Marine Protected Areas. The widest possible interpretation was used to inflate the number of MPA sites regardless of the multiple overlapping designations, and encompassing everything from Ramsar sites and SSSIs with barely any intertidal zone, to the genuinely marine, but weakly regulated, offshore SACs and the single Marine Nature Reserve. The resulting report produced this February runs to about 50 pages but manages to say hardly anything which might improve the effectiveness of the designations, or even if there is any coherence to the whole MPA series. It came as no surprise that virtually the only recommendation was to set up another committee. The fine art of kicking balls into the long grass lives on.

Ivor Rees

From the **Garden**

In a follow-up to a previous report (see NC47, p48), National Botanic Garden volunteer COLIN MILES joins a survey of birds and bumblebees, meadows, mammals and moths.

Last year, on a bitterly cold and dull morning at the end of February, four intrepid volunteers at the National Botanic Garden of Wales (NBGW) set out on the first of what we hoped would be regular, weekly wildlife surveys around the Garden. And so it has proved, every Tuesday morning - whatever the weather. Actually, the weather has been very kind to us and there were only two wet walks in the whole of last year, one of which we used to survey the Great Glasshouse, and although the February storms caused the Garden itself to be closed on two days, we enjoyed four gloriously sunny Tuesday mornings!

The walks themselves start about 10am from the Stable Block and last for a couple of hours or so. Not long, but the very fact of doing it so regularly more than compensates for this. Members are not limited just to the Tuesday morning so we are able to use our knowledge to assist with various public events at the Garden. We now have at least a couple of dozen wildlife walkers (though there are seldom more than a dozen on any one walk) plus additional students, mainly during the summer months.

The format of the walks themselves hasn't changed much since we began, except that we are now more organised. In particular, this year we have decided to focus on Trawscoed Meadow as a study area as it is reasonably close to the main buildings and has a variety of different habitats both in and around it. But this doesn't mean other areas of the Garden are neglected.

We have a monthly bird count within the Garden itself and hope to do the same for bees. We will also be following up last year's successful butterfly orchid count in Trawscoed Meadow and on Waun Las. And we are a bit more systematic in recording our information. This is helped by the fact that we now have some equipment, though we haven't quite yet mastered the GPS locators! But the moth trap is being put to good use in the meadow.

With so many walks and so much information, it is difficult to pick out any particular highlights; but the 'orchid count', the 'mammal traps' (bank voles, shrews and wood mice), the fortuitous re-emergence of tree bumblebees, the sight of dippers flying very close to us, Wales Wildflower Day and the Wales Fungus Day are just some of many.

National Botanic Garden Wales

Typical Tuesday morning weather in Wales

National Botanic Garden Wales

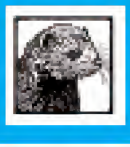
Fungi foray finds

It is not just the number of walks that we have had, now over 60, but the fact that they are regular and that we have many 'eyes' involved. Collectively we see so much more than you would on your own. This is also helped by the different approaches and interests that we have and, speaking personally, as a way of learning about all aspects of nature it is hard to beat.

Wildlife surveys have an important role to play in the conservation and improvement of our countryside. We are hoping that these walks will help us manage the site more sympathetically for biodiversity, and to generate stories which we can then pass on to visitors, through a variety of media.

Currently this is done at the NBGW website, **www.gardenofwales.org.uk** via weekly blogs and social media.

It is also feeding into general interpretation around the Garden and providing press releases for especially noteworthy stories and wildlife-focused guided walks.



Mammals at large

Plotting the path of the polecat

The polecat (ffwlbart) *Mustela putorius* population in Britain experienced a severe historical decline as a result of decades of persecution for the protection of poultry and demand for their fur. By the early 20th century it had become extinct in most of Britain and was confined to a small area of mid Wales and the English border counties. Thanks to a reduction in persecution pressure and an increase in rabbit populations, the polecat population is now recovering and returning to many areas from which it has been absent for over 100 years. The Vincent Wildlife Trust (VWT) has carried out two distribution surveys in the 1990s and 2000s to document this recovery and range expansion. These indicate that polecats have expanded their range from their historical Welsh stronghold and are now present throughout Wales and have spread into much of central and southern England. Outlier populations are present in north-west England and parts of Scotland, due to reintroductions. As polecats have spread from Wales, they have bred with escaped or feral ferrets, resulting in polecat-ferret hybrids. There are inherent difficulties in distinguishing between pure polecats and polecat-ferrets, which may hamper recording efforts, but animals can generally be identified based on pelage characteristics

The VWT is now carrying out its third national survey, during 2014 and 2015, to gather up-to-date information on current distribution patterns and to investigate levels of hybridisation. We are appealing for people to report sightings from all over the UK. During the Trust's last polecat survey in 2004-2006, three times as many records were received from England than Wales. Notably, many 10km squares in Wales, particularly in Radnorshire, Carmarthenshire, Pembrokeshire and Ceredigion, generated no records at all, despite polecats being recorded there in previous surveys between the 1960s and 1990s. Have polecats become scarce in parts of Wales or is the lack of records an artefact of recording effort? Human population and road and traffic density are lower in Wales than in much of central and southern England, so polecats may be less likely to become road casualties and, when they do, there may be fewer people driving on the roads who are likely to see them. There is also a possibility that because the polecat never completely disappeared from Wales, many naturalists may be so accustomed to seeing them that they don't feel the need to report them.

The significance of the Welsh polecat population in a British context has recently become apparent from research at Cardiff University. Mitochondrial DNA sequencing of samples of polecats, polecat-ferrets and feral ferrets from across their British range has concluded that polecat-ferret hybrids most commonly occur outside Wales and on the edges of the polecat's range, thus highlighting the importance of the Welsh polecat population for the conservation and restoration of the genetic identity of the British polecat.

Help with our survey

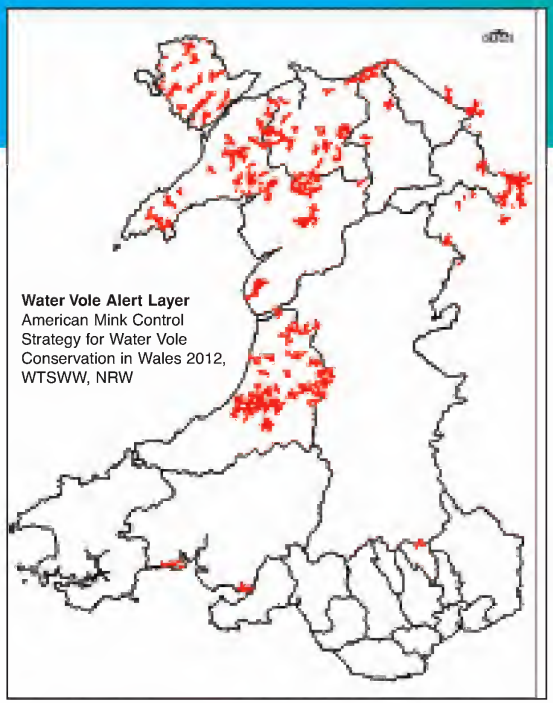
If you have seen a polecat, polecat-ferret or feral ferret please email enquiries@vwt.org.uk, phone 01531 636441 or visit www.vwt.org.uk. Records should ideally include the date and grid reference and, if the animal is dead, a photo and/or carcass. Carcasses will be used for rodenticide analysis and genetic studies and a postage box can be supplied in which the carcass can be returned, free of charge.

Lizzie Croose,
The Vincent Wildlife Trust

Mapping American mink:an invasive menace

Water vole *Arvicola amphibius* conservation in Wales takes many forms, including habitat creation, habitat connectivity through the landscape, reintroductions and the control of their invasive non-native predator – the American mink *Neovison vison*. Given the potential impact of mink on water vole populations, there has been a significant under-recording of the species, resulting in very little being known about their true distribution in Wales. The more we know about mink, the better informed and more effective our water vole conservation projects in the future.

If you saw an American mink at your local river or stream, it probably wouldn't look out of place. Go back just a few decades and mink were a new, exciting and fashionable introduction to the UK. They were brought over from North



Water Vole Alert Layer
American Mink Control Strategy for Water Vole Conservation in Wales 2012, WTSWW, NRW

America in 1929 for the opening of the first mink farm in England, to harvest their thick, glossy fur. However, within 10 years mink were found living in the wild, probably as the result of escapees and poor husbandry, but later as a result of deliberate releases.

The liberated mink have spread across the UK and unfortunately the consequences have been less than favourable for some of our native wildlife. Mink are mustelids, smaller than otters, with dark brown or black fur and small white patches on the chin and throat. They are deadly and skilled hunters, and have a high metabolic rate which requires them to eat a third of their body weight each day. They are not fussy eaters and consume a wide range of prey from fish to birds to small mammals. As they are opportunistic and will switch their prey according to what is available, they are able to survive in a variety of habitats. As semi-aquatic animals they can also travel large distances by swimming, and this has helped them infiltrate and disperse so well throughout the UK.

Hunted: the water vole

Mink have become a menace in many places, preying on domestic wildfowl, poultry and game as well as disturbing our river and still-water fisheries. They also have an impact on wildlife in habitats where they are able to devastate whole populations, including colonies of ground-nesting birds.

Perhaps of greatest concern is their impact on the water vole. This retiring little mammal shares the same aquatic habitats as the mink, living down burrows on the banks of rivers and streams. But unfortunately most mink are the right size to get into the water vole holes, leaving the voles defenceless. It is well known that the water vole is in decline and is now restricted to just a few key areas in Wales. It is also widely recognised that to improve water vole numbers there needs to be a combination of habitat creation and restoration, along with protection against predation by mink.

As mink are an invasive introduced species their numbers are not controlled in a natural way because they have no natural predator. This imposes a responsibility and a requirement for us to deal with the problems that mink cause for our native species.

The Wildlife Trust

Conservation decisions need to be based on research and evidence from the field. Accurate and up-to-date information on the distribution of American mink is vital to ensure that conservation plans for water voles target key geographical areas. The Wildlife Trust of South and West Wales (WTSWW) has recently employed a Water Vole Officer who is currently carrying out surveys of water vole populations in Ceredigion.

However, all we currently have are hazy figures on how many mink are likely to be in Wales, and how widespread they are. WTSWW, working in partnership with Natural Resources Wales (NRW), has therefore taken on the task of trying to collate information from across Wales on their distribution. This information will later be available for organisations involved in water vole conservation, and it is hoped that it will aid co-ordination, partnership and sharing of best practice between existing and future groups.

You can help

If you have seen a mink, please let the Wildlife Trust know:

- The location (preferably with a grid reference)
- The date that you saw it
- The gender and the age of the mink (if known)

We would also be interested to know if you have seen a dead mink, if you are trapping mink, and if you have seen field signs of mink, such as a scat or print.

Please contact us on: **field.assistant@welshwildlife.org** or **01656 724100**

***Lorna Baggett**, South & West Wales Wildlife Trust*

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News

Natur Cymru

After six years and much hard work, our Marketing Manager Huw Jenkins has decided to move on. Huw has worked tirelessly to take *Natur Cymru* to a wider audience through talks, conferences, film-making and blogging, and will be much missed. We are now looking for a replacement 'ambassador' on a part-time basis, ideally based in South Wales. If you think you might have the skills and enthusiasm to help us gain new subscribers please get in touch with us to discuss. Further details will follow on our blog and website.

Rob Strachan

Huw Jones pays tribute to Rob Strachan, a much loved and respected figure in wildlife conservation:

Rob brought a wealth of experience to the field of mammalian ecology. He was an internationally recognised expert on water voles and mammals generally, and was the principal author of the Water Vole Conservation Handbook, *which is seen as the reference document for this species. He wrote or co-authored several books on mammals and published numerous papers on water voles.*

Dedicated to mammal conservation, Rob was generous with his spare time in supporting many voluntary groups in species recording and providing expert input to various specialist conferences. His enthusiasm was contagious, inspiring numerous ecologists, students and volunteers in mammal survey skills.

Holidays were frequently related to his passion for conservation, with recent expeditions to the Middle East and to military bunkers in Eastern Europe to monitor bat populations. He would return from these trips with fascinating photographs, sketches and tales of elusive wildlife. On one trip to Poland, it appears his sustenance comprised of bread dipped in lard washed down with vodka!

Rob died on 17th May after a short illness. He married his partner Jane the day before he passed away.

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